A Scheme for an

Economic Census of India

with special reference to a Census of Production and Re-organization of Statistics

Report by Dr. A. L. Bowley, Sc.D., Professor of Statistics, University of London, and Mr. D. H. Robertson, M.A., Lecturer in Economics, University of Cambridge, to the Government of India.

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LETTER FROM DR. A. L. BOWLEY, SC.D., AND D. H. ROBERTSON, ESQ., M.A., ECONOMISTS INVITED BY THE GOVERNMENT OF INDIA, TO THE SECRETARY TO THE GOVERNMENT OF INDIA IN THE FINANCE DEPARTMENT, DATED NEW DELHI, THE 20TH MARCH, 1934.

We have the honour of submitting our Report on the subjects referred to us.

Before arriving in India on December 22nd, 1933, we had had some opportunity of studying the Reports of Commissions and Committees that have been published in recent years, the general Volumes of the Census of 1931 and other publications. At Delhi, which was our headquarters, we had the benefit of the assistance and advice of the officers of many Government Departments. Nearly half of our time was spent on tours, during which we visited, singly or together, Madras, Nagpur, Calcutta, Dacca, Darjeeling, Patna, Benares, Cawnpore, Lucknow, Allahabad, Agra, Aligarh, Lahore, Bombay, Poona, Ahmedabad and Baroda and took opportunities of visiting villages. Our most prolonged stays were at Calcutta and Bombay. We had every opportunity of consulting government officials, Chamber of Commerce, University teachers and others who were able to give us information or advice, or were desirous of making suggestions within the scope of our reference. We acknowledge gratefully the great trouble that was everywhere taken on our behalf and the hospitality we received.

Our investigations were greatly facilitated by the Indian economists associated with us. Without their local knowledge of conditions, organisations and persons, we should have found great difficulty in using our time to the best advantage, and without their help in detail throughout our progress would have been slower. In particular we wish to acknowledge the great care and efficiency of the office and other routine organisation for which Mr. Fazal who also acted as Secretary was mainly responsible. Though we had the benefit of their criticism in many parts of the Report, the final responsibility for statements and suggestions lies on us, especially as regards any that may be considered contentious.

Owing to the brevity of the time at our disposal, we have felt obliged to interpret the second of our terms of reference in a very restricted sense. We have tried merely to indicate briefly the ways in which improved statistical information may illuminate the familiar problems of Indian economic life and thus, when interpreted with judgment, may help to guide policy.

Important as is their bearing on economic life, we have not concerned ourselves with statistics of metereology, of literacy and education, or of public health, except so far as the last deal with the broad facts of birth and death.

We regret that we have not found time to visit Burma, or more than one Indian State: but we are aware that statistical services are well developed in (for example) Baroda, Mysore, and Hyderabad, and that their returns are incorporated in the general publications of India. There are many of our statistical recommendations in which the co-operation of the States would be of the greatest value.

TERMS OF REFERENCE.

COPY OF A LETTER No. D.-119/F., DATED 6TH JANUARY 1934, FROM J. B. SHEARER, ESQ., I.C.S., UNDER-SECRETARY TO THE GOVERNMENT OF INDIA IN THE FINANCE DEPARTMENT, NEW DELHI, TO ALL PROVINCIAL GOVERNMENTS.

In continuation of the Finance Department letter No. D./5848-F., of the 3rd of August 1933, I am directed to inform you that the Government of India have engaged the services of Mr. D. H. Robertson, Lecturer in Economics at the University of Cambridge and Professor A. L. Bowley of the London School of Economics to advice them on the question of obtaining more accurate and detailed statistics than are at present available in India. There will be associated with these gentlemen in their enquiries the following three Indian economists—Professor P. J. Thomas, Professor of Economics, Madras University; Mr. D. Ghosh, Lecturer in Economics, Bombay University, and Mr. C. Fazal, Assistant Secretary of the Punjab Board of Economic Enquiry. The terms of reference are as follows :—

I. With a view to facilitating the further study of the economic problems of India to report on the existing organisation and range of statistical and other information bearing on the economic condition of India with special reference to the gaps which exist at present and the means of filling them. In particular—

(*i*) to make recommendations as to the organisation of a a central Statistical Department which in addition to the collection of statistics can co-ordinate statistical enquiry and information for the whole of India,

(*ii*) to consider the practicability and scope of a census of production,

(*iii*) to consider the materials obtainable for measurement of national income and national wealth,

(*iv*) to make recommendations as to the initiation or continuation of series of index numbers of prices, wages, production, etc.

II. As it is desirable that the collection of the information referred to under I should be as far as possible designed to serve as a guide to practical policy, the main problems which arise in regard to the full utilization of India's economic resources should be formulated.

2. The English economists and their Indian associates have not been constituted as a formal committee but will work as experts engaged by the Government of India for the purpose of advising on the questions specified in the terms of reference. A further communication will be sent to you when it has been decided what provinces they will be able to visit. In order that their enquiries may prove fruitful they will have to depend largely on the advice of officers of the Provincial Governments, and I am therefore to request that the Government of $\frac{\text{Madras}}{\text{etc.}}$ will be so good as to render them all possible assistance.

CHAPTER I.

THE ORGANISATION OF STATISTICS.

The first part of our main task is to make recommendations with regard to the organisation of statistical information.

The statistics of India have largely originated as a by-product of administrative activities, such as the collection of land revenue, or from the need of information relating to emergencies, such as famines. Only in the case of the population census and to some extent of foreign trade has there been an organisation whose primary duty is the collection of information. As a result the statistics are unco-ordinated and issued in various forms by separate Departments. Though in some branches careful work is being done, and determined efforts made to improve the accuracy and scope of information, in others they are unnecessarily diffuse, gravely inexact, incomplete or misleading; while in many important fields general information is almost completely absent.[1] The only co-ordinated general publication is the Statistical Abstract, which omits some important statistics which must be searched for in other documents. The situation cries out for overhaul under the control of a well-qualified statistician. But a well-qualified statistician is primarily a technical expert, and it is not necessarily his function to decide what statistics should be collected, still less to advise any action. He must be visualised as a part of a larger organism, and at the same time as possessing a large measure of autonomy within his own field.

We have been extremely glad to find in operation an Economic Committee of the Governor-General's Executive Council, whose continued existence we take for granted. At present it is assisted in digesting the multifarious matters which crowd upon its attention by the Director-General of Commercial Intelligence and Statistics, an officer whose own Department is under the portfolio of the Member for Commerce, but around whose post there has gathered an accretion of duties which are performed in England by the staffs of numerous Departments, and some of which have no very close connection with Commerce. We are convinced that the work of economic intelligence has outgrown the organisation which has been improvised to discharge it, and that the time has come for a drastic change.

[1] Justification for this statement will be found in Chapter III below. The rural price statistics are diffuse, Bengal rice figures are held to be gravely inexact, birth and death returns are incomplete and so published as to be misleading, and there is no general information about wages.

We recommend the abolition of the title of Director-General of Commercial Intelligence and Statistics and the establishment of a Permanent Economic Staff, directly attached to the Economic Committee of the Governor-General's Executive Council. The staff should consist of four members. The Senior Member should act as Secretary to the Economic Committee of the Council, to whom he would be responsible for the organisation of the whole work of economic intelligence. Thus he would have the duty of preparing reports on urgent questions as they arise from time to time, and for this purpose would need to organise the supply of current information on economic and commercial events abroad as well as at home. But it would also be his duty to be thinking further ahead, and to take the initiative in planning enquiries of a broader and more fundamental kind.

Two of the other members of the staff would be trained economists,—we confess to a prejudice against the term "economic experts"—while the third, to whose special position we revert below, would be the Director of Statistics. The salaries of the Senior Member, of the Director of Statistics, and of at least one of the Economic Intelligence Officers should be such as to attract men of high ability and standing, and their status such as to ensure them access on equal terms to other principal officers of Government. The remaining member might be a man of equally high natural calibre but of a junior standing; as the programme of work develops, it might be found desirable to appoint one or more additional officers of this grade. So far as possible the staff would function as a staff and not as individuals, but since the field of economics is so wide that no one man can cultivate the whole, the Senior Member and the two Economic Intelligence Officers would divide the territory for exploration between them in accordance with their respective bents and capacities. It would be natural, for instance, that one of them should specialise on the study of the means of promoting the expansion (or, if that be the policy, the orderly contraction) of India's foreign trade, and the operation of tariffs and trade agreements. We think it important that the two Economic Intelligence Officers should work under conditions of the utmost freedom which is compatible with membership of a civil service. Once a problem has been set to them, generally no doubt with some time-limit for its investigation, they should be allowed the largest possible measure of discretion as regards their times and places of work. The whole staff would maintain the closest possible contact with certain other officers of Government, including both some whose duties are primarily administrative and some whose duties are primarily technical and advisory. It would be within its competence to recommend to the Economic Committee of the Council the *ad hoc* engagement of external technical experts for the purpose of reporting on the economic

potentialities of particular areas or of particular branches or processes of production.

We are of opinion that a small group of this kind, devoting their whole time to the study of the practical problems which are appearing at any given time on the economic horizon, and organising the collection, and in suitable cases, the publication of the relevant information, is much more likely to produce fruitful results than a more general and heterogeneous council, the members of which would be chosen to represent special interests and would be mainly occupied with other affairs. In a constitution in which the representation of sectional groups and interests already plays an unusually prominent part, the need for such an adjunct to the ordinary machinery of democratic government is not obvious to us : but whether or no it be decided to create such a council for the ventilation of opinion, our views about the necessity of a permanent economic staff would remain unchanged. Even if no such council is formed, it should be the duty of the staff to take active measures to keep itself continuously informed of the trend of ideas and opinions in the business world.

The Director of Statistics, while being a member of and a principal organ of information for the Permanent Economic Staff, should have his own peculiar duties, in the discharge of which he would enjoy a considerable degree of independence.[1] These would include (1) the conduct of the population census, (2) the conduct of the census of production, (3) the co-ordination of central statistics, and (4) the co-ordination of provincial statistics. To assist him in these duties the existing Statistics Branch of the Department of Commercial Intelligence and Statistics[2] would be transferred to his control, and some addition to its permanent numbers would be required.

(1) In India, as in America, the machinery of the population census is organised hastily before the census, and disbanded after the publication is complete. A new Commissioner is appointed for each occasion, who can only profit by the experience of his predecessors so far as their published reports or any special memoranda left behind by them enable him to do so, and who has no

[1] This would be a reversion to the position which prevailed some years ago, and the restoration of which was recommended by the Royal Commission on Agriculture. Since we are recommending even wider duties for this officer than did that Commission, we naturally endorse their view that "it would be useless to engage any but a first class statistician for the duties we have in mind. The officer selected must be of sufficient standing to make his advice acceptable not only to the provincial statistical officers but also to the business world and the informed public" (Report, page 620).

[2] The Commercial Intelligence Branch of this Department, which is mainly engaged in dealing with the enquiries of the commercial world, would become a branch of the Department of Commerce.

time to organise any far-reaching improvement. The subordinate staff is for the most part inexperienced in the work, which is in fact of a highly specialised character. In the circumstances the Indian Census is a quite astonishing achievement, but it is overweighted with dead matter which no one has the leisure to devise methods of excising, while on the other hand it gathers fruits of living knowledge which no one has the leisure to prepare for the table.

It is inevitable that by reason of advancing age no man can be responsible for more than two or three decennial censuses; but continuity can be preserved if a small permanent office organisation is kept in being. We recommend that the Census of Production, to be described below, should be quinquennial, as is the case in many countries, and that while the main Census of population continues to be decennial, a supplementary census with an abbreviated schedule of enquiries, mainly devoted to numbers, age, sex and occupation, should be taken in the middle of the decennium. The censuses of population and production should be as nearly synchronous as the requirements of tabulation permit. Preparation for the censuses and analysis of their results would provide nearly continuous work for a special section of the permanent Statistical Staff, which would expand on the occasion of the taking of the decennial population census into a larger organisation.

We have no doubt that the population census ought to be tabulated by machines of the Hollerith type. These machines are rented, not bought, so that the charge is annual. The process of sorting and assembling is probably quicker than the hand process, and more accurate.[1] A further great advantage is that all details are preserved, and any special analysis by subjects or districts can be very speedily and cheaply prepared.[2] In fact when the machinery is once installed, frequent use could advantageously be made of it.[3]

(2) The census of production is discussed in detail below (Chapter II., Section 4). Here we need only remark that uniformity of classification between the occupation tables of the census of population and the industrial tables of the census of production is very desirable, but not at all easy to obtain. In the English

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[1] See 1931 Census, Vol. 1, Part V (Administration Report), page 4.

[2] For instance it is now impossible to recover the 1931 occupational statistics for any town for which the statistics were not published in the Census Report. This hampers the project of Urban Surveys discussed below (Chapter II, Section 6).

[3] For further suggestions about the population census, see Appendix to this chapter.

population census there is now a double classification by industry and occupation which may be found suggestive for the purpose.[1]

(3) In India, as in most countries, the statistics collected by each department are classified and arranged to meet its own needs, and are with difficulty correlated and co-ordinated for more general purposes. In England this difficulty is only partially overcome by consultation between the Departments (*e.g.*, the Board of Trade and the Ministry of Labour) and by an advisory committee under the chairmanship of the Government Actuary. In India the very fact that statistical activity has developed in a somewhat lop-sided manner should perhaps make the task of co-ordination somewhat easier than it is in a country in which strongly entrenched statistical sections exist in each of a number of different offices. The Director of Statistics should have power to consult with those responsible for the preparation of statistics in all Departments, with a view to arranging for uniformity of classification, and for the furnishing of statistics needed for general purposes, without prejudice to the assembling of other data necessary for departmental use.

He should be responsible for the publication of the Statistical Abstract, as to the composition of which some suggestions are made below (Chapter IV., Section 2).

(4) Much of what has been said about central statistics applies also naturally enough to the provincial statistics from which in most cases the former are derived. In some provinces there is a whole-time statistician at work, in others there is not. Where such an officer exists, or has existed, it may be under the ægis of the Board of Revenue, who can claim that their prestige is necessary to him in what is bound to be one of his most important tasks,—that of attempting to effect continuous improvement in the primary data collected by the revenue staff; or under that of the Director of Agriculture, who can offer him most technical work; or under the Director of Industries, who can offer him the largest virgin field to subdue.[2] We should have no desire to suggest a rigid uniformity of organisation among provinces, even if their different financial situations did not render it unlikely that such a suggestion could be effective. But we have little doubt that ideally there should be in each major province a whole-time statistician, as nearly independent of departmental

[1] In England the decennial population census is carried out by a permanent Registrar-General, who has a small permanent staff; a quinquennial census and a larger permanent organisation have been recommended on good authority. The quinquennial census of production is conducted and tabulated by the Board of Trade, the general classification by industries being co-ordinated with fair success with those of the Registrar-General and the Ministry of Labour.

[2] In Bombay the main statistical activity is concentrated in the Labour Office.

control as administrative requirements permit, but making his services available to all departments, passing all their statistics under his review, conducting the population census under the direction of the central Director of Statistics, and co-operating with the latter in every possible way. Pending the establishment of such officers everywhere, it will be for the Director to establish such contact as he can in each province with whoever most nearly fills the bill, with a view to promoting uniformity in the provincial statistics and thus facilitating their assembly into all-India totals.

With regard to general economic intelligence, we do not make any such suggestion for the provinces as we have made for the centre. But we imagine that the existence in one province of a Cabinet Economic Committee which is presumably in course of developing a small digestive Secretariat deserves study elsewhere. And we are willing to believe, on the evidence of the excellent work done in the Punjab, that—if only in order to promote co-operation with the local Universities—the case for the establishment of joint official and non-official Boards of Economic Enquiry is stronger in the provinces than we have thought it to be in the centre.[1]

[1] We understand that the Statistical Laboratory, Presidency College, Calcutta, has already been found useful by more than one province for the analysis of problems requiring statistical technique.

APPENDIX TO CHAPTER I.

FURTHER NOTE ON THE CENSUS OF POPULATION.

The whole subject of the organisation and publication of the Census is discussed in the Census of India, 1931, Vol. I., India, Part V.—Administration Report, by Dr. Hutton, where many valuable and important suggestions are made, on some of which we may comment, though it is not necessary to allude here to the changes suggested in details of administration and compilation. We have no doubt that the Census Act should be made permanent (Section 2); and we have already made recommendations for the establishment of a permanent office. We agree that a Census on a *de jure* basis is more suitable to India than the *de facto* basis (Section 3), with the proviso that the *de jure* basis should refer everywhere to as nearly as possible the same day, by adding births and subtracting deaths that have taken place in each village or smallest recorded unit between the date of the preliminary records and the appointed date.

A considerable part of the publications follows lines which have become traditional, and it is time to consider afresh the relative importance of the Tables included. We agree with Dr. Hutton (Section 17) that the returns by *caste* and *religion* should be replaced by a return of *community* in the original schedule. In Vol. I., Part II., tables relating to caste or religion occupy more than one-fifth of the 632 pages of the volume; the space and the expense of collection and compilation would be greatly diminished by the change.

The space saved could well be utilized by expanding the Tables relating to occupation. Rural should be treated separately from Urban Population in the first part of Table X., Vol. II. (General Table for India), and similarly in the Provincial Censuses.[1] As it is, we cannot tell, for example, how many of the 3,174,000 persons occupied in "Cotton spinning, sizing and weaving" are in the towns and country separately.

At the same time details should be furnished for more towns. In some Provinces only towns with over 100,000 persons are shown separately in Occupation Tables, while in Madras the 22 towns with more than 50,000 persons are distinguished. We think it advisable to show at least all towns of over 20,000 persons,[2] with the totals for smaller towns, in each Provincial Census. The Tables, if confined to the columns "as principal occupation," would be of only moderate length, especially if they were confined to totals of "orders" and "sub-orders" which number about 60.

A further very important distinction is made in other countries between employers, those working on their own account and the employed. We recommend that the possibility of this classification in India should be very carefully considered, at least as applying to the towns, where a very large number are working directly for the market. To save space in printing this division need only be applied to the category "as principal occupation."

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[1] There would be no need to make the division also in the much longer second part (Provincial Distribution), since the figures would be available in the Provincial Volumes. In fact this Table X, Part II, might be greatly curtailed in Volume I., since its purpose is only to show the relative importance of separate occupations in the Provinces, and the figures are given *in extenso* in the Provincial Volumes.

[2] There were in 1931, 371 such towns in India.

These changes are necessary to give a realistic account of the occupations or means of livelihood of the people in the towns and in the villages. At present it is impossible to make more than a very rough approximation to the amount of work of a non-agricultural kind carried on in the villages, or of agricultural occupations of persons resident in towns. It is not possible to collate the returns in the Factory reports with those of similarly named occupations carried on in houses or workshops. Above all information essential for making estimates of income is absent, so long as town and country, and so long as employers and employed, are merged together.

Where these or any other changes are introduced, it is of first importance that comparability with earlier Censuses, or at least with the 1931 Census shall be preserved, even at the expense of some duplication of tabulation.

Finally, we may commend the practice of Madras in 1931 of printing the essential information for each village in a booklet for each district. In most provinces there is no information available to the public for regions smaller than a tahsil or taluk; and we imagine that these booklets might be of considerable use in local administration.

CHAPTER II.

THE MEASUREMENT OF THE NATIONAL INCOME.

1. We have been invited to consider the materials available for estimating the national income and wealth of India. As will be seen more clearly in Chapter III, these materials are very defective. To put it briefly, the statistics even of crop production leave much to be desired, while statistical information about other important parts of agricultural income, such as the output of animal husbandry, are almost completely lacking, and statistics of industrial production are patchy in the extreme. Undeterred by these difficulties, various persons have from time to time attempted to estimate the national income. We do not propose to comment on these estimates, since, whatever their merits or demerits at the time they were made, in any case they are now out of date. Nor do we propose to make any guess of our own. Instead, in the main part of this chapter we put forward certain practical proposals for a fourfold enquiry which, while also serving other ends, will enable the problem of measuring the total national income to be re-approached *ab initio*. But first, in view of the confusions which sometimes arise,[1] it will be worth devoting a little space to a more general discussion.

The national income is the money measure of the aggregate of goods and services accruing to the inhabitants of a country during a year, including net increments to, or excluding net decrements from, their individual or collective wealth. It is probably best to ignore catastrophic decrements of wealth, such as might be caused by an earthquake in Calcutta[2] or a severe epidemic of cattle plague.

As is well-known, there are two methods of calculation, the first consisting in an evaluation of the goods and services accruing, the second in a summation of individual incomes. The two methods do not furnish a check on one another over the whole field: thus the services of Cabinet Ministers must be held to be worth the amount of their salaries, since there is no other way of evaluating them. In the case of India it seems unlikely that the

[1] For instance, the Taxation Enquiry Committee considered that the land revenue "forms a deduction from the national dividend" (Report, page 67), while Messrs. Wadia and Joshi, in estimating the national income, deduct the value of new investment in the country by non-residents twice instead of once. ("The Wealth of India", pages 105 and 107).

[2] As a curiosity, we leave this passage as it was first drafted at the end of December, 1933.

first or census of products method will ever be applicable over the whole even of the industrial field : and special caution in combining the results of the two methods may be necessary.

The first or census of products method involves—

(*i*) evaluating the net output of the various branches of 'productive' enterprises, agriculture, mining, industry, etc., at the point of production, being careful to avoid double counting (*e.g.*, counting *both* the output of wheat *and* the labour of the cattle employed in raising it);

(*ii*) adding the value added to home-produced goods and to imports by transporting and merchanting agencies in the country;

(*iii*) adding excises on home-produced goods;

(*iv*) deducting the value of exports (f. o. b.), including gold and silver;

(*v*) adding the value of imports (c. i. f.), including gold and silver;

(*vi*) adding customs duties on imports;

(*vii*) deducting the value of goods, whether home-produced or imported, which are used for the purpose of maintaining fixed capital, or stocks of raw and finished goods, intact;

(*viii*) adding the value of personal services of all kinds;

(*ix*) adding the annual rental value of houses, whether rented or lived in by the owners;

(*x*) adding the increments in the holdings of balances and securities abroad, whether by individuals or Government, or deducting the decrement in such holdings: and/or deducting the increment in the holdings of balances and securities in the country by residents abroad, or adding the decrement of such holdings.

Some of these processes call for further comment :—

(*i*) That part of the products of agriculture, etc.,—in India very large—which is consumed by the producer or bartered locally for services should be valued, like the rest of the outturn, at its price at the point of production, not at the retail price which consumers in distant markets pay, and which includes cost of handling, etc., which are not incurred on the home-consumed outturn.

(*iii*), (*vi*). This is necessary, because the total we are in search of is the aggregate of exchange values *to the consumer*.

(*iv*), (*v*), (*x*). It is easily seen that if the Government of India raises a loan in London for railway construction, the securities imported form part of the real income of the English investors, just as an import of Indian tea would do. The reverse side of the same truth is that the increment of capital wealth in India, which is included in the evaluation of production or of imports, is balanced by a capital liability to foreigners, and must be deducted to arrive at net income.

The same considerations apply to changes in the ownership of bank balances, at home and abroad, and —in the case of India very important—to increases or decreases in the stock of precious metals, which for this purpose may be visualised as foreign securities.

(*viii*) (*a*). Strictly speaking, it may be argued that only those services of Government servants should be included which confer direct utility,—protection, amenity of life, etc.,—as distinct from assisting to augment production,— the value of the latter having already been included, like other costs of production, in the sale value of the product under (*i*). The subtleties to which this complication leads do not seem worth pursuing here; in what follows it will be assumed for simplicity that the services of *all* Government servants confer direct utility and form part of the real national income: deductions can be made to taste by those who please.

These services should be valued at a sum which includes the pension rights accruing during the year to those who render them.

(*b*) In India the distinction between charitable gifts, which are not part of income, and the payment for services of a customary or religious nature is peculiarly indefinite: and the line drawn is bound to be somewhat arbitrary.

The census of products above described is the more fundamental of the two methods of evaluating the national income. In order that the results of the second or census of incomes method may tally with it, certain precautions in following this second method must be observed.

(*i*) All self-consumed produce and receipts in kind must be included in the individual's income, valued at their selling value at the point of production. So must the annual value of houses lived in by the owners.

(*ii*) All interest payments, even on loans incurred for consumption purposes, must be deducted before entering the individual's income.

(*iii*) Apart from this, the incomes of all individuals in the country, including interest on Government loans and pensions of *ex*-Government servants, should be entered gross, *i.e.*, before payment of direct taxation (including land revenue). The incomes of Government servants should be entered inclusive of pension rights accruing during the year. To the total so reached should be added the undistributed profits of companies and the net profits of Government enterprises. From the total so reached should be deducted the sum required to pay the interest on Government loans other than for productive enterprises, and the pensions of *ex*-Government servants, whether due at home or abroad.

(*iv*) Rather oddly, receipts from customs and excise, stamp duties and local rates—*i.e.*, all taxes which are of the nature of business costs—must be added to the total so far reached. For the latter is the aggregate of exchange values accruing to producers, while the true national income, as calculated on the census of products method, is the aggregate of exchange values accruing to consumers. Unless therefore this addition is made, discrepancy will arise.

The suggestions which we make below relate to the estimate of the broader sections of the national income: the various adjustments indicated above would have their place in a final calculation.

2. We do not recommend for India at present any estimate of national wealth as a whole. There are two methods followed elsewhere, neither of which is appropriate to India. The first is to capitalize the yield of all income-bearing property, including goodwill, assigning appropriate numbers of years' purchase to the rent of land and houses, dividends, interest, etc., and sometimes to add estimates of property publicly owned such as docks, railways, government buildings, etc. The second is to use the statistics of property passing at death, obtained at probate, etc., and with the help of life tables to deduce the total value of property. This procedure is impossible in India since there are virtually no taxes on inheritance. As regards the first method there is certainly not enough information for the valuation of most of the important classes of individual property; and, though the value of railways could be estimated, that of roads, of some irrigation works and of many other results of public expenditure defies measurement.

Though we cannot expect to measure with any precision that would justify the attempt, the *total* of wealth, it may be possible to give some indications of its *change*, by series relating to public expenditure on permanent works, to investment of new capital and to other expenditure of the nature of capital outlay. This is developed below (Chapter IV , Section 2). It must, however, be admitted that the abandonment of the attempt to measure wealth introduces a difficulty both into the preparation of series of this kind, and into the main problem of measuring the national income. For, as already stated, the national income is (broadly) the gross national output less that part of it which is needed to keep capital intact. In all countries the attempt to define this latter quantity creates difficulties, since the line between replacements and improvements is hard to draw, and since conventional allowances for depreciation under income-tax laws do not necessarily correspond with the sums actually expended for this purpose. If the aggregate of capital wealth itself cannot be measured, the difficulty of measuring the amount of the gross product required to keep it intact is necessarily increased.

3. The investigation we propose for the purpose of estimating the national income is primarily on the basis of production, but as in similar estimates in all countries a minor part depends on individual incomes. In India the proportion to be thus estimated is probably greater in the towns, but much smaller in the aggregate than in Western countries. Partly owing to difference in nature of the products and partly because different methods of investigation are necessary, rural income is distinguished from urban income.

For rural income we advocate an estimate of the quantity and value of all produce and services arising from the land or rendered in the villages, by the method of intensive surveys in selected villages.

For urban income we recommend in the first instance surveys of the larger towns on the method which has been successfully followed elsewhere. This is based on a sample enquiry of the personnel and occupations of families, and an estimate of their incomes partly by personal statements, partly by investigation of wages and salaries current in the town. For incomes over Rs. 1,000, or at least over Rs. 2,000, income-tax statistics can afford valuable help.

We have recommended also an intermediate Urban Population Census. These three enquiries would be supplemented by a Census of Production applied to factories using power, mines and some other industries. This would to a considerable extent overlap the urban survey and to a less extent the rural survey. But it is of considerable importance in itself, and is calculated to furnish a more accurate account of part of the whole field than the other surveys.

It is believed that when all the materials are assembled, means can be found to eliminate duplication, by estimating the part of the income included both in the urban or rural surveys and the Census of production, or by other methods.

It will remain to estimate on the basis of population and of the results of the main surveys the income of the smaller towns. Additional estimates may be needed for the tea plantations and any other special areas not included in the rural survey.

All the investigations should be extended to the Indian States so far as they are willing and able to co-operate. For areas not so included estimates will be necessary by the use of agricultural statistics.

These proposals will result in fairly precise estimates for large and definite sections of the income of the population and of the produce of the area of India. When these are established effort will be necessary to diminish the region of guess-work and increase that of ascertained fact. Meanwhile an estimate of the total produce or income will be possible within certain limits. If for 80 per cent. of the whole the results are correct within 5 per cent. (or 10 per cent.), and for the remainder are only correct within 10 per cent. (or 20 per cent.), the estimate for the whole will be correct within 6 per cent. (or 12 per cent.).

The relative importance of factory manufacture, other town activities, and rural production can, it is believed, be found with all necessary exactness by these methods; and, if appropriate yearly series are constructed to show the changes in each sphere of activity, the changes of the relative importance can be well estimated. The main difficulty here will be to find means of measuring the change in non-factory industrial activities; here the successive censuses of population should supply the essential information.

The aggregation of these surveys and censuses and the establishment and analysis of the yearly returns relating to them will be matters needing great statistical ability and should be part of the duty of the Director of Statistics whose appointment we recommend above.

The order and dates of the complete scheme would be as follows :—

1934. Appointment of Director of Statistics.

1935. Organisation of the enquiries and training of investigators.

1935-36. Rural Survey.

1936. Census of Production. Urban Surveys. Urban population and occupation census.

1937. General Report.

We cannot estimate with any precision the whole cost of these investigations, but we may suggest the following round numbers:—

	Rs. lakhs.
Census of Production	2
Rural Survey	22
Urban Surveys	3
Urban Census	2
Report	1
	30

The Urban Census would be confined to Tables of Age, Sex, Conditions as to marriage and occupation; and the opinion has been expressed that the above allowance (which is over Rs. 5 per 1,000 persons enumerated) is perhaps excessive.

4. *Census of Production.*—The Census of Production would be imposed (as in Great Britain) by a special Act of the Central Legislature, making communication of the facts demanded compulsory. It would be conducted by the Director of Statistics, the executive arrangements presumably being made through the Department of Industries and Labour. It appears to be necessary to limit its scope, so far as English and American methods are followed, to the larger establishments: and the natural line which suggests itself is that drawn in the Factory Act, *viz.*, the employment of 20 or more persons combined with the use of mechanical power. It would not seem desirable to extend it automatically to those smaller establishments to which, for special reasons of no great statistical significance, Provincial Governments have used their powers of extending the Factory Act. But on the one hand there may be *some* classes of small workshop to which the Census could advantageously be extended: while on the other there are certainly some large non-mechanical establishments, *e.g.*, in building and constructing, brick-making and carpet manufacture, which ought to be brought within its scope. So also should the railways and all establishments under the Mines Act.

The average number of operatives employed in factories in British India (excluding Burma) in 1932 was 13,30,000; though this forms only a small proportion of persons engaged in industry, this group is of special importance in relation to export, and for this and other reasons quite properly special attention has been given and should continue to be given to its study. It is to be remembered, however, that the progress of factory industry is to some extent at the expense of cottage industry, and it is of the greatest importance to bring the two in statistical relation to each other. There seems to be no possibility at present of making any exact estimates. The execution of the proposed rural and urban surveys will provide some data; accurate estimates of the crops of

cotton, sugar and other agricultural products which are manufactured both in houses, etc., and in factories, are capable of giving more complete information. There is also a possibility of tabulating the census material relating to occupation in such a way as to show the whole numbers engaged in such occupations, so that when used in conjunction with the factory statistics some idea of the relative importance of the two organisations of industry could be obtained. The 1931 Census of Population in fact shows, as might be expected, that the numbers engaged in industry in British India as a whole is very much greater than those accounted for by the factory statistics. While there is no immediate possibility of comparing the numbers in, or output of, factories with those in similar cottage industries, it may be possible to obtain some annual data which would show their relative growth or decrease, when the whole of the survey now suggested is complete.

Examples of the schedules used in Great Britain have been handed to the Director-General of Commercial Intelligence and Statistics. For the first taking of the Census the questionnaires should probably be simplified, and in any case will need adaptation to Indian circumstances. It has been customary for the Board of Trade in London to consult representatives of Industry as a whole on the general form of the schedule, and representatives of special industries on the detail of the questions.

The essential facts to be elicited are the aggregate value of the sales and the aggregate cost of materials for each factory. The difference, named in Great Britain the value of the 'net output'[1] and in the United States the 'value added by manufacture', approximately measures the contribution to the national income of the factory, or, when aggregated, of the industry (so far as it is carried on in factories), after allowance has been made for depreciation of plant and change in value of stocks of materials and finished goods. This value is also the sum divisible among employees, employers, owners and the local and central governments.

Besides this main estimate, details can be obtained of the amounts and values of different commodities produced, and of materials bought, and of the power used. The arrangement of this part of the schedule is the main subject to be discussed with the trade representatives. It is important that the classification of products should agree with those of exports and imports.[2]

The number of employees should be stated, divided as salaried and wage-earners, male and female, young and adult with an

[1] The 'net output' of railways is the service of transportation. Its value can be measured by subtracting the cost of material and upkeep (excluding wages) from the total receipts for carriage of goods and persons.

[2] See the criticism made by the Tariff Board, Report on Cotton Textile Industry, 1932, page 192.

exact statement of the age-division between the two. It may be best to get these details for one week in each month of the year, so as to obtain an average for the year and an indication of seasonal movement. It should be considered whether *sirdars* should be shown separately. The results of the Census should be tabulated so as to show for each industry the distribution of firms by numbers employed.

The Census, at least in its first taking, would be overloaded, if much detail was asked about wage-rates or earnings. But the total wage-bill for the year could be required,[1] possibly with some sub-divisions. Where labourers are engaged and paid by a sirdar, efforts should be made to determine how much the sirdar keeps. Besides wages paid in cash monthly or at short intervals, there should be included a statement of all annual or other cash bonuses and cash expenditure for workmen, with a statement of advantages obtained by provided houses or land.

The project of a Census of Production was discussed with Chambers of Commerce and with individuals in Calcutta, Bombay and elsewhere. Opinion appeared to be unanimous that a Census was desirable, so long as it was general and compulsory and identification of individual firms was impossible in the Report on it. It also seemed to be the opinion that no opposition would in general be made to filling in the schedules, even those relating to wages, though it was thought that some firms would object to giving figures which could be used to show buying and selling prices, or in sugar-mills the percentage extraction. More doubt was expressed about the probable accuracy of the returns in some classes of factories, among other reasons because of the fear that the Income-tax officers would have access to them. The Calcutta Chambers of Commerce expressed their willingness to co-operate in the effort to secure accuracy.

It seems impossible for us to form an opinion on the question how much effort would be necessary to overcome opposition and verify doubtful figures. No doubt when the Census is periodically repeated, these difficulties will be less. Nor can we form more than a guess about the expense. Since the number of enterprises is not great, we do not think that it would be at all prohibitive; but if, as seems natural, the work of enforcement is entrusted to the Factory Inspection Staff, the latter will undoubtedly need strengthening for the purpose.

5. *A Rural Survey.*—It is desired, as part of the Survey of Indian Income and Resources, to obtain information in numerical form of the Income (in cash or kind) derived from the land, and

[1] Reference may be made to the (voluntary) reports on earnings obtained by the Ministry of Labour, London. See the Ministry of Labour Gazette.

its distribution among owners, occupiers, labourers, etc., together with other items of village income.

It is impracticable to make direct investigation into the circumstances of each of the half-million villages in British India in any reasonably short time, even if the expense could be met or a sufficient number of investigators found. It is, therefore, necessary to proceed by sampling.

The intensive studies so far made or now in progress in the Punjab, Madras, the United Provinces and elsewhere, while demonstrating the practicability of obtaining satisfactory data by the method followed, have not been selected so as to make any generalization possible. They have indeed in many cases been in villages chosen as representative of special types, and are therefore not representative of a district or province as a whole.[1]

The method usually advocated in India is to divide a province into a number of areas, each homogeneous in itself, and investigate a typical village in each area. It is almost certain that such homogeneous areas could not be delimited with sufficient accuracy, and that their number would be too numerous for investigation. To aggregate the results for such districts, if they had been selected and investigated, would require a set of multipliers which could not be readily ascertained, though there is some material for the purpose in the United Provinces. This so-called representative method is not advocated for these reasons, and also for the perhaps more important reason that it would not be possible to compute the probable error of the result.

The fundamental condition for obtaining a total or average based on a sample enquiry is that *every unit in the aggregate shall have an equal chance of being included.* This condition can be satisfied by various methods of selection. The method advocated for the present problem is that which has been successfully followed in other investigations. Briefly it is to make (or rather to use an already made) list of all the units in the aggregate, *e.g.*, of the 86,618 villages of the Bengal Presidency—arranged in geographical order of districts, and having decided on the number to be investigated—say 200—to mark in the list one in 433 $= \frac{86,618}{200}$ approx.) throughout. Thus, if we begin with the first village, the 1st, 434th, 867th, ... 86,168th, as counted through the ordered list would be the villages to be investigated. (It is better, however, not to begin with the first, but with some random number in the first 433.)

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[1] We should mention also the special investigations into the Cost of Production of sugar and of cotton under the Imperial Council of Agricultural Research, and the general enquiries into the cost of agricultural production required by recent Land Revenue Legislation in the Central Provinces.

Each district, and the majority of the taluks, would thus be represented, and a due proportion would be included in every large homogeneous district. There is no objection to arranging the taluks in an order that corresponds to various types of cultivation, if this is done *before* the selection is made from the ordered list.

To obtain the total for the Presidency of any group or quantity which is the subject of measurement we have to multiply the aggregate for the selected villages by $\frac{86,618}{200} = 433$ approx.[1]

When the village has once been selected by the process described, no other can be substituted for it, without grave risk of error, however untypical it is or however difficult to investigate. Every peculiar and remote village must have the same chance of inclusion as a village regarded as typical, on *a priori* grounds.

A measure of the probable accuracy of the results can be calculated from the returns themselves by technical methods described at the end of this Report,[2] so that they can be stated as trustworthy within an assigned percentage. A rough test can also be made by dividing the sample into two, the first of which would contain Nos. 1, 867, ... of the above list, the second Nos. 434, 1,300 ... and observing how nearly they agree.

The adequacy of the whole method of sampling can be tested by computing from the returns such totals or averages as are already known, *e.g.*, total areas, total male population, ratio of males to females, land revenue, etc., and seeing whether the estimates differ from the facts by more or less than the computed probable error.

The method has been tested by the help of the Census of 1931, 100 villages out of 39,549 in the Madras Presidency, and 200 from 5,725 in four districts in the Punjab were selected. In each case the population, males and females, the number of houses, the relative numbers of villages of different sizes, and some figures of languages and religion, were computed from the sample and compared with the completed reports. The results are tabulated in the Note (see pages 22-3). In every case the agreement was within the limits foretold by theory. The consilience of the calculations from the samples and known results is in some cases very striking. The test was in fact a very severe one; for example, the number of persons in a village varied from 3 to 4,708 in the Madras sample, but the average is correct within $4\frac{1}{2}$ per cent. After consideration of these figures it was decided that a minimum of 200 villages should

[1] See, however, Appendix II, pp. 78 *et seq*, for an alternative method of estimating certain totals.

[2] Appendix II pp. 78 *et seq.*

be the rule for each province or part of a province for which a separate total or average is desired.[1]

A possible allocation would be :—

Province.	Number of villages in Province.	Number in Sample.
Bengal	86,000	250
Bihar and Orissa . .	83,000	300[2]
Bombay[3] . . .	21,000	200
Central Provinces . .	40,000	200
Madras	51,000	200
Punjab	35,000	200
United Provinces . .	106,000	300
Total .	422,000	1,650

These Provinces together contain about 95 per cent. of the area sown in British India excluding Burma. It would of course be advantageous if the procedure here advocated were followed by the larger Indian States.

Before the selection of villages it would be best to exclude the tea plantations of Bengal, the districts where coal mining is important, and the areas affected by the recent earthquake, unless they are sufficiently resettled by the date of the enquiry; and there may be other minor areas within the Provinces for which the method is unsuitable. To make the total for British India some estimates must be made for these areas, and also for Assam and the North-West Frontier Province and minor provinces. Suppose that the investigation by sample is applied to 90 per cent. of the villages of British India, and that the error in an estimate is 5 per cent., while in the remainder the estimate is 25 per cent. wrong, the error in the aggregate is raised to 7 per cent.

It will be necessary that an investigator should live in each village for twelve months,[4] with some intermittance or vacation in the times of agricultural idleness. In many cases the villages could be grouped in threes and fours within, say, 30 miles of each other, and a superior investigator attached to each group, living in the largest village and superintending the investigators in the other two or three.

[1] A smaller number, still selected at random, may be sufficient for districts known to be homogeneous, but only in respect of those quantities in which the homogeneity exists.

[2] The number is increased to allow for separation of the figures of Bihar from those of Orissa.

[3] Excluding Sind.

[4] Where the village is very small, so long a continuous period would be unnecessary, and the investigator could help in another village whose size was such as to overtax the powers of one man.

A qualified statistician should be in charge of each Province, and the whole survey should be controlled by the Director of Statistics.

The necessary schedules should be prepared by the Director in consultation with the Provincial Statisticians, and in them attention should be paid to local terms of measures, weights, etc., and in other respects they should be adapted to local conditions. The selection of villages ought to be made at an early stage, so that so far as possible investigators should be chosen who had linguistic and other local knowledge, and the number of superior investigators be decided.

The investigators would need a preliminary period of training in suitable centres, University or other, where the nature of the enquiry, the method of investigation, and the detail of the schedules should be explained in detail, and at the same time their suitability for the work be tested.

These preliminary processes would need considerable care and take a long time, so that if the survey is to take place in 1935-36, an early beginning of the task is necessary.

While in order to establish personal and confidential relations with the villagers, the investigator should not be marked as a government official, he ought to have contact with all the officials in or concerned with the village and be allowed all reasonable access to their records. It has been suggested that the help of the village schoolmaster could be obtained for a small payment and would be of considerable use in some places.

On the basis of Rs. 4,000 each for the Provincial Superintendents, Rs. 1,500 for the group investigator, and Rs. 900 for the subordinate, the total salaries for the seven provinces would be about :—

	Rs.
7 Provincial Superintendents	28,000
470 Superior Investigators	7,05,000
1180 Assistant Investigators	10,62,000

i.e., about 18 lakhs of rupees; to this must be added the cost of training the investigators, travelling expenses, assistant computors' fees, office expenses, and printing, central and provincial. A total of 22 lakhs should be sufficient to cover the whole cost of the Survey.

Besides the main enquiry which is directed to income, production, consumption and allied topics, the investigators would have ample time to report on other subjects, such as health, co-operation, debt, etc., and also to visit neighbouring villages. But since the tabulation and printing of the results of supplementary enquiries would add to the expense unless this were met out of non-governmental funds, the supplementary enquiries must be limited.

General Headings of Information to be obtained.

[A detailed questionnaire will be needed : see Appendix I , pp. 70 *et seq* below.]

A. Existing data from Census, Agricultural and Revenue returns, etc.

B. Classification by means of livelihood of every family and every person resident in village.

C. Estimate separately and in detail for each family the annual net income, in cash or in kind, not yet valuing the kind.

D. Account for the whole product of the area, distinguishing reservation for seed, direct consumption, payments in kind and sales in or outside the village. Include sale of cattle, etc.

[D exceeds the total of C by payments to non-residents or government, less any income earned outside the village.]

E. Evaluate the kind in C. and D., by village prices if used within the village, and by market prices (less cost of transport, if any) if sold at a market. Estimate the total income of the village.

F. Estimate the quantities and values of all goods (including cattle, etc.), purchased outside or from travelling salesmen.

G. Make annual budgets in cash and kind separately for typical families.

Supplementary enquiries:—

Rough estimates for previous years and for an "average" year can be made from annawari yield recorded.

Births and deaths as compared with those recorded.

Conditions of health.

Prices in village and in neighbouring market.

Yield as compared with that used in the agricultural statistics.

Customary rates of wages.

Amount of debt, and interest paid.

Migration.

Work by members of the village families who do not reside in the village.

Receipts from absent members.

Capital value of houses.

Cost of cultivation.

Estimate of the cost and value of cattle and other animals.

Note on Rural Survey.

Results of the Madras and Punjab samples, based on 100 and 200 villages respectively.

The whole Madras Presidency, less the Ganzam and Vizagapatam agencies, was the subject of sampling, 1 village out of 396 being selected. In the Punjab four Central Districts were chosen, and one village out of 28 or 29 was selected.

Number of Villages of Different Sizes, per cent. of all Villages.

Size of village.	Madras.		Punjab.	
	Sample.	Province.	Sample.	Districts.
Less than 500 persons . .	44	42	49½	50·6
500 to 1,000 ,, . . .	25	24	31	28·8
1,000 to 2,000 ,, . . .	17	21	15½	15·8
2,000 or more ,, . . .	14	13	4	4·8
Total .	100	100	100	100

Number of Persons per House.

	Madras.		Punjab.	
	Sample.	Province.	Sample.	Districts.
Male	2·45	2·46	2·60	2·63
Female	2·52	2·52	2·18	2·21
Total .	4·97	4·98	4·78	4·84

	Madras.		Punjab.	
	Sample.	Province.	Sample.	Districts.
Males per 1,000 females . .	970	970	1,192	1,191
Houses per village . . .	188	197	143	145
Population per village . .	936	981	683	704
Per 1,000 persons—				
Hindus	925	900	165	119*
Sikhs	...	...	399	372
Muslims	...	...	410	456
Christians	...	...	17	14
Telugu speaking . . .	41%	39%	...	...

*These figures are not exactly known for the country apart from the towns.

6. *Urban Surveys.*—According to the Census of 1931 there were 1603[1] cities or towns in British India (excluding Burma and Aden) with a population of 28 million persons, *i.e.*, about 11 per cent. of the whole population.

So far as we can ascertain no attempt has been made to estimate the incomes or production of these towns as a whole, though there have been some studies on special subjects, such as housing and labour conditions, and on particular occupations, and some sporadic statements of wage-rates. The statistics relating to Factories, and the statistics of Incomes assessed to tax cover only very small proportions of the population.

The tabulation of occupation or 'means of livelihood' in the Census of 1931 unfortunately does not separate towns from rural districts, and since many occupations (carpenters, potters, etc.) are carried on both in town and country, only very rough ideas can be obtained about the occupational distribution in the aggregate of towns. But full detail is given for all cities or towns with a population exceeding 100,000 in all provinces, and in Madras, the Central Provinces and the United Provinces for all over 50,000 or even over 20,000. It has been recommended above that in the next census the occupations should be shown in each Province for the aggregate of towns and for each town containing more than 20,000 persons. Possibly the list of occupations could be abbreviated in some groups for this purpose.

Since Universities and Colleges are in nearly all cases situated in large towns, it happens that full occupational detail is generally available in the Provincial Volumes of the 1931 Census for each University or College town.

It does not seem practicable to organise a simultaneous survey by selecting random samples of towns of different sizes in the various Provinces. A town survey needs the services of a group of persons working in co-operation and equipped with local knowledge; in general such a group is not available, the expense is considerable, and the process of selection by sample more hazardous and difficult than in the case of villages.

It appears to be necessary to deal with the problem step by step, first by a synchronous survey of those cities in which satisfactory investigation can be organised by Universities, secondly

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[1]

	No. of Towns.	Population (000s).
More than 100,000	27	7,630
50,000 to 100,000	50	3,470
20,000 to 50,000	203	6,110
Under 20,000	1,323	10,720

Of the towns with less than 20,000 persons, nearly half the population was in the group 10,000 to 20,000.

by making similar, but perhaps less intensive, surveys of other towns. The synchronous investigation, for which a scheme is developed in some detail in the sequel, might cover 30 or 40 of the larger towns with an aggregate population of perhaps 8 million. The results would give some basis for rough estimates for the remaining 20 million of the urban population of British India, based on the results of the proposed intermediate Census. The roughness of such an estimate (applying to about 8 per cent. of the population) would evidently have little effect on the precision of an estimate of the aggregate income of British India, if that was required. Our suggestion for obtaining greater accuracy in the future with regard to this unexplored region is that after the Rural Survey and the University City Surveys are completed, some of the more efficient investigators should be engaged to survey selected towns of various sizes; the experience already gained would suggest the most practical methods of procedure.

University City Surveys.—We have discussed the question whether the Economics Departments of Universities are able and willing to undertake surveys with the staffs of these Departments in Madras, Calcutta, Dacca, Patna, Benares, Lucknow, Cawnpore, Allahabad, Agra, Aligarh, Lahore, Ahmedabad and Bombay, also at the meeting of the Indian Economic Association at Annamalai in January and at the meeting of the Inter-University Board at Delhi in March.

Since we had already received offers of co-operation, especially in reference to an Economic Survey, and since in several cities some investigations of a relevant kind had already been made or were in progress, we were not surprised to find a general readiness to undertake the work, if a practical scheme was devised.

While it was generally recognised that the intimate and confidential information needed could not be obtained by governmental authority, but only by unofficial and tactful personal contact, it is thought necessary to have official backing both for the purpose of obtaining the co-operation of Central and Local officials in studying the data already officially collected, and to regularize the use of such public financial help as might be obtained.

In the organisation of the group of surveys it will be necessary to combine central control with local autonomy. We may suggest the institution of a Central Committee, consisting of the Director of Statistics, a representative of the Public Instruction authorities, and two or more University economists nominated by the Indian Economic Association. This Committee should draw up an outline schedule of enquiry, covering the main subjects on which information was required with sufficient definition to ensure that the reports on these subjects from the various cities should be comparable. The same Committee should be prepared to advise on any points submitted to it, and in the end present a report on

the whole subject. The Committee would need money for travelling expenses (one initial and one final meeting should be sufficient), for correspondence, and finally for preparing and printing its report.

The procedure for organising the Surveys will differ according as they fall to Government Colleges or to self-governing Universities. In the former the concurrence and co-operation of the Director of Public Instruction and the Government in the Education Department would be necessary for the expenditure of money or the allocation of the duties of a member of the College staff. In the latter arrangements could presumably be made through the governing body with the Economics Department, and the organisation of the Survey be completely autonomous. In each city the Survey should be directly by one of the Economics staff, part of whose usual duties should be suspended for a year to allow time and energy to be devoted to it. The detailed investigations should be carried out by graduates working for higher degrees, or by post-graduates and others connected with the University, while some of the tabulation could be done by under-graduates.

We propose that the Surveys should be made in the University year 1935-36. Before that date preliminary steps ought to be taken in arranging for the services of a lecturer and training the investigators. We return to these subjects later. Since a considerable part of the work can fall within the normal activities of the University or College, and since funds and personnel are already available for survey work in some Universities, the expense of 40 surveys would not be great. We consider that an average of Rs. 6,000 per survey (more for the larger, less for the smaller towns) should be sufficient;[1] the division of such a sum between the salary of the director, payment to the investigators, and incidental expenses would vary from place to place. On this basis 40 surveys would cost Rs. 2,40,000 and with Rs. 60,000 for central expenses and any additional subsidies needed, the whole expenditure would be Rs. 3,00,000.

It would be a great advantage to University education in Economics, if advantage could be taken of this scheme to give a more realistic bent to economic studies, and in particular to give statistics a more definite place in the curriculum. In our opinion elementary statistics should be an examination subject (not universally compulsory) for a first degree in Economics, occupying one year, with a class in practical handling of data annexed to each lecture. Further we may venture to commend the practice of some Universities in replacing some of the M. A. examination papers by a thesis, and express the hope that this may be done

[1] The investigations in English provincial towns published in "Livelihood and Poverty" and "Has Poverty Diminished?" cost less per town than this. The much more elaborate "New Survey of London Life and Labour" cost very considerably more.

elsewhere. The thesis could very well be based on work done in connection with the Survey. Even if there was no thesis, possibly credit could be given for such work as part of the higher degree course. This programme would need some reorganisation of the examination, of the syllabus, and of the duties of the teachers of economics; in some cases it would involve the appointment of a teacher fairly well qualified in statistics. Where this is a question only of adjustment in existing schemes, the ultimate expense is nugatory.

Whether such re-organisation is accomplished or not, it will be necessary to give some training to the students who are to take part in a Survey; and we see no essential reason why this should not be merged in their curriculum.

So far as a survey is incorporated in the ordinary University organisation of teaching and study, the expense is reduced, or, alternatively, the survey can cover a wider field. Where the work is once introduced into the University curriculum, further investigations on the innumerable economic problems and the complicated economic structure of cities and their neighbourhood could be made year by year, till the time came for a repetition of the major survey. Also there would be trained men who could extend the region of surveys to other towns, as indicated above.[1]

Finally the Universities would be prepared to undertake any statistical economic work for a Provincial Government, and act in co-operation with an Economic Advisory Council, where one exists.

Some suggestions for the detail of Surveys are appended.

Detail of Survey.—The main objective is to supply data for estimating the relative importance of urban and rural activities in the National Economy, with sub-division by nature and scale of industries and services.

There are two methods of approach:

A. Occupational; B. By families.

A.—An occupational Census is almost essential. The 1931 Provincial Census of Population Volumes supply great detail for most university towns, which needs careful handling, especially since employers are not separated from employed.

In each industry and occupation of any importance in the town, enquiries should be made about current rates of earnings and wages, estimated over the year and allowing for seasonal variations,—including not only the workers in constructive industries, but also clerks, municipal and railway employees, tonga-drivers, and all others working for salaries or wages or making small profits.

[1] It may not be out of place to suggest that the training of students in statistics and their practical application would improve their equipment for commercial and official posts.

It is of interest to record also the method of payment (piece or time) and the organisation of employment (direct, working on own account, etc.) and of marketing the products.

B.—An accurate list of houses or tenements is necessary. Where the local authorities have only a list of houses assessed to tax or local rate, it may be necessary actually to survey the locality and make a supplementary list. The Census states the number of houses in 1931. In towns of more than, say, 150,000 persons, it is probably best to sub-divide into wards or groups of wards, so as to take as units not more than 30,000 houses. The procedure is then as in the New Survey of London Life and Labour,. It is decided to select about 1,000 houses in each unit, a number sufficient for the precision desired and not too great for tabulation. In the list of, say 30,000 houses, one in thirty is marked systematically, so that a selection at once random and nearly equally spaced through the town is obtained. Each of the houses so selected is visited and no substitution of other houses is allowed.

Friendly relations having been established by the visitor, non-contentious information is obtained about numbers, sex and approximate ages of the family group and of occupation. With great discretion data are sought on earnings and income. Often repeated visits are necessary. On the basis of ten successful visits per week, 10 investigators would cover the 1,000 houses in 10 weeks.

Prepared cards or schedules of enquiry are necessary, but usually these should be filled in immediately after and not during the visit.

The information obtained under A. can be used to supplement or check data of income under B.

Each card is criticized, and arranged for tabulation, by the supervisor.

The main difficulty is to estimate the income of families of dealers who both make and sell, and of the richer class. Where it is probable that the income is assessed for tax at Rs. 1,000 or over,[1] this should be recorded, and in the compilation of all towns some estimate can be made from Income-Tax figures. To some extent also a rough idea of the number of assessees can be given by the Income-Tax authorities, but in the Calcutta Income-tax Office, for example, neither the income nor the number of persons assessed is confined to residents or to activities in the city. In some cases the nature or assessed value of the premises may be a clue. In the summary there will be an entry for a rough estimate of numbers of families, persons and of income, where the income exceeds Rs. 1,000.

[1] Allowance, however, should be made for the possibility of incompleteness of the record of incomes between Rs. 1,000 and Rs. 2,000.

The totals should, in every case of doubt, be given as within a certain range, not as an exact number. The percentage error assignable to aggregate income can thus be recorded.

All existing data bearing on the subject of the Survey emanating from Central and Local Authorities, trade organisations, social institutions, etc., should be studied, and all possible co-ordination should be sought with these official and other organisations.

A difficulty will arise in preparing the data so as to combine them with the Census of Production of factories, etc., that come under the Factory Act. It is suggested that an estimate be made of the numbers and earnings that are included both in the Town Report and in the Census of Production, for the use of the Central Committee.

It is not recommended that any measurement of the number of families in Poverty should be made, though this was one of the principal objectives in the English Surveys. The necessary preliminary work of the definition of a minimum standard of living has not been carried out for India, and, with the great diversity of standards and methods of living, it is doubtful whether it is practicable.

The report to the Central Committee should be confined to the subjects in the questionnaire issued by them. Other information can be published or recorded locally, or in University studies.

CHAPTER III.

SERIAL STATISTICS.

1. *Introduction.*—Before proceeding to the discussion of the detailed statistics of production, prices and wages, it is well to state summarily the relevant conditions of the construction and intention of index numbers. In each field they depend on three stages, (*i*) the measurement at one date and place of a definite quantity (or price or wage), (*ii*) a series of numbers proportional to the changes in that quantity in time, (*iii*) the assembly of a group of these series into one by a process of averaging.

As regards (*i*) it is sufficient to state that the entity measured must be completely defined,[1] and as regards (*ii*) that the definition should be absolutely unchanged over the period covered by the series.

(*i*) has its immediate use for comparing prices, wages, etc., from place to place or occupation to occupation at one date;

(*ii*) is important in itself for studying the change in time of prices of one commodity at one place or of wages in an occupation.

(*iii*) Averaging may be of series relating to the changes in different places of the prices of one commodity or the wages of a defined occupation. Or the averages may extend over a group of series of quantities (retail prices or wholesale prices or wages in general), and then they are usually constructed from the average series of the first kind.

Only those series should be averaged which relate to some common quality, and in general index numbers should not be formed by averaging series which are heterogeneous, such as birth-rates, prices, and production of commodities.

The average may be simple (unweighted) or weighted. In every index number discussed in the sequel (except perhaps those relating to the prices of a single commodity such as rice or salt) weights should be applied, unless it is found by trial that they have negligible effect. The weights may, when many series are averaged together, usually be rough, as can be tested by working with various modifications of them. But the roughness or approximation permissible is closely related to the dispersion of

[1] There is a fundamental difficulty in the first process of dealing with reports depending on weights and measures in India, in the great variety of units and of their presumed equivalents not only between provinces but among neighbouring villages, and many of the balances and weights used are said to be inaccurate and capable of manipulation.

the movements of the series averaged. If all the series move in strict proportion with one another, all systems of weighting give the same result. But if, for example, the price of cotton moves quite differently from the price of wheat, a great deal will depend on the choice of relative weights given to the two.

It is because of this consideration that in the sequel we recommend the postponement of the construction of some index numbers till the appropriate weights are ascertained. In other cases postponement is necessary till trustworthy elementary series are available.

In all cases the quantity or tendency which the index number is designed to measure and its scope of application must be defined or described, before the choice of the series to be averaged together or the system of weighting is decided. Thus wages may be urban or rural or both, production may be industrial only or extended to agricultural, prices may be regarded in relation to world prices or internal prices, and wholesale prices may be needed for general purposes or for comparison with retail.

Only when definition is adequate at every stage, and the data of quantities and for weights are sufficiently accurate for the purpose which the index number is intended to fulfil, ought index numbers to be constructed.

Where data are collected, in relation to which there has been little experience, it is advisable to test their adequacy and accuracy by every possible means before series depending on them are incorporated in index numbers. Each new branch of statistics needs a period of growth before its fruits are mature.

Statistical measurement that depends on multifarious data is necessarily approximate, and results should not be given to more significant figures than can be justified by the nature of the returns and their manipulation in averaging.

Our recommendations are based on these principles, after as detailed a study of Indian statistics as we have been able to make.

2. *Growth of population.*—"The vital statistics of India are well known to be defective."[1] This is evident both by knowledge of the methods of record of births and deaths, and by comparison in total or detail with the population censuses. Thus in the decade 1921-30 about 83,500,000 births and 63,500,000 deaths were recorded in British India, while the increase between 1921 and 1931 was according to the Censuses 24,700,000 instead of 20,000,000[2]. While there is probably a deficiency in the record

[1] Census of India, 1931, Vol. I., Part 1, page 91.

[2] The defect is more than 4·7 millions in 83·5 millions, because deaths as well as births are unrecorded.

of deaths, it is evident that that in the record of births is more considerable.

The only excuse for estimating birth and death rates at all on these figures lies in the hope that the error is constant and therefore the tendency towards higher or lower birth or death rates can be known. But since any improvement in the organisation results in apparently higher rates, the evidence would only be valuable if a decrease was shown, whereas in 1921-30 there is no clear tendency in either direction. The figures published in the Statistical Abstract (Tenth Issue, pp. 460-1) are definitely misleading, for they are worked on the population of 1921. If allowance is made for a 9 per cent. increase in nine years, the birth-rate stated as 35·99[1] per 1,000 in 1930 would become 33·0, as compared with 32·2 in 1921. It should be seriously considered whether these figures should be published at all, except for areas where there was reason to believe substantial accuracy is obtained, since they lead to quite unjustifiable conclusions. They have their use, however, to medical officers of health if these are aware of their limitations. If published, at least allowance should be made in the denominator for the growth of population.

Meanwhile no effort should be spared district by district to improve the returns, as has been found possible in some Provinces. The records in the towns are said to be more imperfect even than in the villages, and there is no good reason why the town organisation should not be brought up to the level reached in other countries.

The badness of these statistics affords a strong argument for the institution of a quinquennial population census, the intermediate censuses being much less elaborate in detail of schedule and in publication than the usual decennial census.

Meanwhile it is possible to make a fairly good, if hypothetical, estimate of the growth of population by the use of the Life Tables given in the Actuarial Report in the Census. These tables do not depend on the records of death, but on the study of the figures of the Censuses of 1921 and 1931. Their accuracy is reduced by the aberrations that are known to be present in the statements of ages, but the mathematician is able to smooth these away with reasonable accuracy. By applying the Life Table to the (amended) numbers in the 1931 Census, it can be estimated how many at each age will survive for 1, 2,.....10 or more years. Thus the population aged 10 years or more in 1941 can be forecasted, apart from migration, on the hypothesis that the rate of survival in 1921 to 1931 is repeated in the following decade. This assumes that the average death-rate age by age is the same in the second

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[1] The computation of these rates as here to four significant figures when the second figure is known to be too low, cannot be justified.

as in the first decade, and great aberrations from this will be evident even in the imperfect records of deaths.

This process has been roughly worked out for males between the ages of 5 and 55 in 1931, and therefore (if they survive) between the ages 15 and 65 in 1941. The tables correspond with those issued by the League of Nations for several countries in connection with the Geneva Economic Conference.

All-India excluding Burma.

Males.

Age-groups.	Recorded in 1931.	Expected in 1941.
	0000s.	000s.
15 to 20	1535 ...	2086
20 to 25	1561 ...	1855
25 to 30	1479 ...	1336
30 to 35	1259 ...	1314
35 to 40	1107 ...	1191
40 to 45	944 ...	1040
45 to 50	732 ...	801
50 to 55	577 ...	643
55 to 60	396 ...	465
60 to 65	314 ...	336
Total 15 to 65 . .	10,004 ...	11,067

= *Increase 10½ per cent.*

It is said that the ages of males under 25 years are usually accurately stated; if that is so, the figures for 1941 up to the age of 35 are trustworthy if the hypothesis of similar death-rates in the decades 1921-31 and 1931-41 is valid. In the higher ages the accuracy depends on the success of graduating away mis-statements of age between the ages 25 and 55. The fall 'expected' in the age-groups 25 to 35 between 1931 to 1941 is due to low birth-rates in 1906-16 and other special circumstances affecting these age classes. The increase to be expected in the number of young men, under 25 years, is very noticeable.

The following Table shows similar figures for the major Provinces based on separate Life Tables for each :—

Males Age-groups.	Bombay.		Bengal, Assam and Sikkim.		Madras.	
	Recorded 1931.	Expected 1941.	Recorded 1931.	Expected 1941.	Recorded 1931.	Expected 1941.
	0000s.		0000s.		0000s.	
15—25 . .	207	258	554	703	401	531
25—35 . .	203	177	536	461	365	349
35—55 . .	228	264	585	639	464	497
55—65 . .	45	51	107	125	107	113
	683	750	1,782	1,928	1,337	1,490
Increase . .	10 per cent.		8 per cent.		11 per cent.	

Males Age-groups.	Central Provinces, Berar and Hyderabad.		United Provinces.		Punjab.	
	Recorded 1931.	Expected 1941.	Recorded 1931.	Expected 1941.	Recorded 1931.	Expected 1941.
	0000s.		0000s.		0000s.	
15—25 . .	270	332	462	557	239	296
25—35 . .	246	231	424	394	200	206
35—55 . .	299	325	512	549	232	265
55—65 . .	66	79	106	121	61	64
	881	967	1,504	1,621	732	831
Increase . .	10 per cent.		8 per cent.		14 per cent.	

The increase for Bihar and Orissa similarly computed is 14 per cent., but it is impossible to make allowance for the effects of the earthquake.

There would be no difficulty in working out similar computations for intermediate years. If the age-distribution of females at the Census could be made fairly accurate, and if birth records were improved, the important statement of number of births per 1,000 women of reproductive age could be given for any year.

3. *Agricultural Statistics.*—No correct perspective of the relative importance of urban and rural activities is possible, till the statistics of agricultural produce are improved.

The outstanding need for all-India statistics is a new system of recording the area under crops and the yield in the areas under Permanent Settlement. The inaccuracy here has a serious effect on the world estimates published by the International Agricultural Institute at Rome, and on the estimated relative importance of India as a food-producing country. The figures at present are quite insufficient to determine whether or not food is increasing in proportion to population.

Outside the permanently settled areas the existing method was designed for assessing land-revenue, observing the existence or danger of famine or distress, and affording evidence for increase or decrease of assessment, and it appears to serve this purpose adequately in most cases. The forecasts based on it during the maturing of the harvest also give a rough indication of the *variation* to be expected from the previous years; though they are incorrect as actual measures of the crops, they differ from the true results, as estimated otherwise for the export crops, in a fairly regular way. For other purposes they are known to be quite unreliable in most cases.

We proceed to discuss possibilities of improving the existing method, and then suggest for consideration an alternative method.

The existing method.—Though there are considerable differences from province to province the well-known procedure may be summarized as follows :—

Area sown.—Except in the areas under "permanent settlement" it is stated that the area sown under each main crop is known with very fair accuracy. There is, it is believed, some tendency not to show changes from a previous year, from carelessness or from a desire to avoid questions, and in Bombay it was stated that the local official in charge of seven to ten villages does not visit the fields, but deduces the area from the amount of seed the cultivator states he is using. These errors could be avoided if the higher officials gave sufficient instruction and criticism.

In the permanent settlement areas, however, where there is not the same detailed revenue organisation as in the rest of British India, the annual statistics of area are generally admitted to be almost worthless except for jute, tea[1] and possibly sugar. The method for obtaining the area under jute is based on a detailed return on a printed form in each village showing the area under jute field by field, and this process is calculated to give accurate totals, if properly supervised. The Royal Commission on Agriculture in India, 1926, recommended (paras. 527, 531) that the same method should be applied to other crops, and it appears that the expense would be moderate when considered in relation to the great importance of making good this great deficiency in Indian crop statistics. In fact this is by far the most important reform needed, since without it improvement in the computation of the other factors is nugatory.

The seasonal factor.—For each district a standard yield is determined and stated in maunds per *bigha* or otherwise[2]. At the beginning of the season the village accountant reports the area sown of each crop, and these are aggregated in *tahsils*, districts and provinces. Once or more during the growth of the crop and again at the time of harvesting the village accountant estimates the yield as so many annas, taking a definite number of annas, *e.g.*, 12 or 16 as standard. The *tahsildar* receiving such statements from the villages in his tahsil takes some sort of average of them, using his general knowledge of the crop condition, and reports a single result, such as 10 annas, for the tahsil to the District Officer. This official modifies these numbers according to his knowledge or discretion, and either proceeds as did the tahsildar and selects a single number of annas for the district as a whole, or, applying the anna yield to the area sown in each tahsil separately, reports an average for the district.

The process of criticising and amending the village accountant's figures by his superior officers is necessary because the former is believed to have an inclination or bias to report (*i*) no change from the previous year, or (*ii*) an average crop, when the yield is moderate, and (*iii*) to underestimate a good crop, and (*iv*) to exaggerate the fall in the case of a bad crop. It is apparently thought that the tahsildar can form a better judgment, and also that District Officers by using other sources of information can correct the tahsildar's estimate.

So far the reports have been through the revenue officers, but at this stage the District Officer reports the area sown and the anna yield to the Director of Agriculture, who uses them in conjunction with the standard yield for each district to estimate the

[1] The statistics for tea appear to be detailed and complete, though they are criticised by the Indian Tea Association.

[2] About the standard yields, see pages 38-39.

district total; at the same time he has his own sources of information from his subordinates.

One result of the whole procedure is that there is no attempt to give the estimate for the tahsil, in some cases for the district, as more precise than one anna in 12 or 16, or, since there is a preference for even numbers, than two annas in 12 or 16; indeed Collectors would not usually trust their judgment more closely than this. Thus the error in the estimate is as likely as not to be half an anna, 3 or 4 per cent. out, and cannot claim greater precision than this.[1] The harvest cannot, from this reason alone, be correctly stated to more than two significant figures for a district, *e.g.*, 340,000 tons.

It is probable that an estimate by a skilled agriculturist of the yield of *a single field* could not be given in finer terms than the nearest integral number of bushels to an acre, and is therefore as likely as not to be ½ bushel, or say 1 per cent., wrong. In fact harvest results cannot be known with great precision in any country, however good its organisation for the purpose. But in the Indian procedure the detailed arithmetical methods that would give more accurate results are almost deliberately avoided.

The average which the tahsildar or the District Officer should take of the numbers submitted to him is very vaguely defined. It is probable that he does not attempt to take an arithmetical average, but simply chooses that which is given most frequently (technically the mode) or ignores the figures and gives a number on his own judgment.[2]

If the village accountant's bias can be corrected by his superior officer and the yield stated with reasonable confidence to the nearest anna for each village, then the arithmetic average of these statements would have high precision.[3] Greater security would be obtained by weighting the average, that is applying the anna estimate to the sown areas in each village separately, and this is probably worth the trouble, even though on purely theoretical considerations the increased precision is very slight. At this stage the anna method should be translated into a percentage and three figures given, *e.g.*, 69·1 per cent. of standard for the tahsil. To

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[1] If the fact was anywhere between 7 to 9 annas it would presumably be given as 8.

[2] None of the officials to whom we spoke was able to define his procedure in this respect.

[3] If there were 900 villages in a tahsil, the average of each village would be as likely as not to be correct to ½ anna and of the 900 to 1/120 anna.

state this to the nearest even anna would make it 12 annas out of 16, or 8 annas out of 12, and introduce a deliberate mistake.[1]

The only justification for not taking averages in such a way is if the village accountant's estimate must be completely discarded. If this is necessary then a determined effort should be made to obtain an estimate for each tahsil to the *nearest* anna. This applied to the area sown tahsil by tahsil would (if areas and standard were correct) give results of very fair precision.[2]

No process of averaging, however, can remove a general bias, and it is not worth while to apply any refined process to areas (be they villages, circles, tahsils or districts) unless the bias has been removed and the correctness of the integral anna statement can be accepted.

It is futile to improve any one of the three factors to a greater precision than the other two have, so far as the total harvest is concerned. But since the seasonal factor is used independently of the "standard" its accuracy is of importance, even if the other factors are erroneous.

Standard yield.—In most cases the standard yields are based on estimates of old date and of doubtful validity, and are occasionally and locally modified by crop-cutting experiments. The definition of standard involves a very loose definition of averaging.[3] To obtain a standard for so large an area as a district in any case presents another very difficult problem in averaging over numerous village areas. We have evidence that the standard is infrequently modified, and that when new data compel a change, it is made

[1] In one of the patwari's books we saw the nature of the crop was shown for each field together with the presumed annawari yield, and the area sown was stated with close accuracy. If an unweighted average was used of these statements, and if each was to the nearest even anna, the results for the village would have high precision, and the result for the tahsil and still more for this district would be as accurate as required.

[2] In the Punjab there are 116 tahsils. The average of these, each to the nearest anna, would be as likely as not to be correct within 0·2 per cent., and could be trusted (so far as this factor is concerned) to 1 per cent.

[3] The normal or average crop is "that crop which past experience has shown to be the most generally recurring crop in a series of years; the typical crop of the local area; the crop which the cultivator has a right (as it were) to expect and with which he is (or should be) content, while if he gets more he has reason to rejoice, and if less he has reason to complain. Briefly, it is stated to be the average yield on average soil in a year of average character. The normal or average yield will not necessarily correspond with the average of a series of years' figures, which is indeed an arithmetical abstraction and may possibly never occur." (From "Estimates of Area and Yield", 1931-32, page 44; the wording is the same as in a circular dated 1897.) It appears from this very confused wording that the "mode" of a series of years is the average intended.

on a "conservative" basis, that is the modification is smaller than the evidence suggests. The changes thus made are primarily due to irrigation and other improvements in the water supply or land.

Somehow the village accountant, the tahsildar, or the District Officer has to relate his impression of the crops over a wide area with this gavuely defined standard and to state his results in the anna notation. It is evident that, even if there were no bias to over- or under-statement, the result must be imperfectly informed guess work. It is certainly prudent to state the totals in units as large as 1,000 tons, as is the custom in the official publications.[1]

Improved seed.—From the enquiries we have made we have formed the opinion that the effect of sowing improved qualities of seed on output is only shown in the figures partially or not at all. It is believed that an improved crop is not compared with a standard yield of a hypothetical unimproved crop as it should be for comparisons with years before the improvement, but with what the better seed would produce in an average year. It is thus probable that the increase that is known to have taken place from the records of areas sown with selected seed is very imperfectly shown in the figures. This may be the cause of the excess of the yield shown by recent crop-cutting experiments over the standard. The uncertainty from this cause makes it impossible to ascertain whether the quantity of food produced is keeping pace with the population. Improvement in quality as distinct from quantity cannot generally be shown in the yield statistics, and is probably not sufficiently taken into account in unofficial estimates of the value of agricultural products based on price statistics.

An alternative method.—Our direct investigations have suggested that, while the estimate in annas is ingrained in a considerable part of India, the alternative method of estimating in maunds per bigha, bushels per acre or similar units is fairly widely understood. In fact in the Punjab we found that the estimates were first named as maunds per acre and then transformed to annas by faulty arithmetic applied to a hypothetical standard. If the direct method were introduced, dependence on the standard would be completely avoided. Since the areas, the only other factor involved, are or can be known with very fair accuracy, attention should be concentrated on removing or correcting bias in this estimate. This involves inspection in considerable detail of the fields with knowledge of the village

[1] The statement that the yield of rice in India in 1931-32 was 33,052,000 tons, however, implies an accuracy of one part in 33,000. In 1930-31 the yield is given as 32,198,000 tons. These figures may be sufficient to establish the existence of an increase between 2½ and 3 per cent.; but over a longer period the comparison is much less trustworthy.

accountant's estimate, and is work that is appropriate to the officials of the Agricultural rather than of the Revenue Department.

The ideal system would be to have, as is done for jute, a form in which the area of each plot sown is entered, and to give in a separate column the estimated number of maunds (or bushels) per unit area. By multiplication and addition, the estimated yield for the village would be obtained. This process would probably involve too much time and expense. The alternative is to take an average yield for the village as a whole; preferably the average would be an unweighted arithmetic average (not the mode) of the village accountant's separate estimates. If by any means an estimate for the village, correct to the nearest integer in maunds, could be obtained, the process of accumulating the resultant figures into totals for tahsils and districts would lead to the increased precision due to averaging discussed above.[1]

In this process all area under cultivation should be included, and more sub-division might be obtained in respect to a number of land products not included at present as "Principal Crops."

We recommend that this proposition should be carefully examined, and that it should be tested wherever the circumstances are favourable.

The existing annawari method would have to be continued also, at least for the present, so as not to disturb the traditional assessment of revenue. But it is of great importance that so far as rapidly as possible the Agricultural Departments should have an increasing share in constructing the general estimates of yield.

Education.—Though a proportion of the officials concerned with crop forecasts have knowledge of the statistical methods appropriate to this work, the majority, especially of the lower ranks, have no appreciation of the problems involved, and little interest in the performance of their duties, which are simply routine. We believe that here, as in other spheres of reporting figures, definite education in statistics is urgently needed. We suggest that wherever any of the appointments are subject to examination *ad hoc* or to other examinational qualifications, statistics should be included as a subject. Only an acquaintance with the more elementary ideas of definition, classification, averaging and relative precision, need be included, and a quite short course of instruction would be sufficient for intelligent persons with arithmetical ability. At the same time the idea of the fundamental importance and

[1] It would be preferable to use weighted averages throughout; but little precision would be lost if the simple arithmetic average of the village returns was taken to one-tenth of a maund for a tahsil, and the results applied to the sown area in the tahsil to obtain the total for the district.

interest of these crop statistics should be fostered in all ranks, so that real effort may be made to obtain correct returns, and among other things the tendency to report no change for fear of trouble in answering queries should be eliminated.

Improvement resulting from education must be gradual, but vivification of interest may be immediate, and a great deal can be done by studying the detailed statistics and applying various processes of criticism and verification,[1] such as are already advocated by the more advanced agriculturists.

Livestock.—There is at present a quinquennial Census of animals, for which the Board of Agriculture and Animal Husbandry in India and the Advisory Board of the Imperial Council of Agricultural Research have already recommended a wider classification. There is little information about animal products, though some detailed enquiries have been made and some general estimates exist. It is a matter of prolonged and intensive work to determine the output of milk and its products, honey, meat, eggs, hides, wool, silk and bones, and the trade in these products. It is hoped that the Rural Survey will provide general estimates on several of these subjects, but more detailed knowledge is very desirable, and this would probably best be gathered by Provincial Organisations working in conjunction with the Imperial Council of Agricultural Research.

It may be possible to organize the collection of information about the *fish* taken in certain waters or landed in certain harbours. Since fish is in some districts an important constituent of diet, it is desirable to explore these possibilities.

Culturable waste.—As already stated, the statistics of the absolute amount of land under cultivation are in the main satisfactory. The same cannot be said of the statistics which purport to show the extent to which the potentially cultivable area is actually cultivated. Even if Burma be excluded, and even at the peak of prosperity in 1928-29, nearly one fifth of the land of British India was returned as "culturable waste." It is admittedly impossible to draw a hard and fast line between land which could *never* be cultivated, and land which under *some* conditions of prices, labour-costs and population pressure might be: but it seems certain that a large part of this land is for all practicable purposes uncultivable. It would seem probable also that the criterion of cultivability adopted differs in different areas; thus it is hard to believe (though we are not in a position to deny) that natural differences alone account for the fact that 27 per cent. of the area of the Central Provinces is returned as culturable waste, and less than 2/5 of 1 per cent. of the area of Berar. Admittedly,

[1] It appears that the elementary method of checking the areas reported as sown under various crops with the total area cultivated in each area is not in general use.

moreover, there is great lack of uniformity in the line drawn between "culturable waste" and "current fallow". In spite of the difficulties we urge that this matter should be examined afresh by the authorities concerned, with a view to considering whether some other classification of uncultivated land—for instance into "old and current fallow", "land occupied for public purposes" and "other uncultivated land"—would lend itself to securing more informative results. In the last resort we think it would be better to abandon the attempt to distinguish between the various kinds of uncultivated land than to continue to publish the present figures, which, in a country already full of real problems, suggest the existence of one which is almost certainly imaginary.

4. *Production.* (*a*) *Individual Commodities.*—It is understood that proposals are already being considered for the construction of series relating to manufacturing industries. The main difficulty, apart from that of obtaining complete data, is the selection of one or more exactly definable products, which on the one side give definite indications of the activity of an industry, and on the other are suitable for combination in a general index of production.

Thus in textiles measurements are possible of the quantity of cotton or jute baled, of deliveries to mills of the bales, of the amount of yarn spun, and of the quantity of tissues woven. The raw cotton should be classified as Indian, Egyptian or American, possibly with further subdivision. The yarn should be shown separately by counts, and also as spun in India or imported, and the fabrics both by length and area, with sub-classification where possible. The cotton and jute industries require all these statistics for their own purposes, and their organisations should have an important share in their collection and publication. For national purposes, however, only one or two should be selected, and their choice depends on facilities for obtaining the figures and on the closeness of their relation to the whole product of the industry.

The same principles of obtaining all possible and useful series for the information of the industry, and one or two typical series to represent the product of the industry as a whole, apply to all industries.

In some cases it is only possible to measure the raw material used, because the finished products are diverse, and change with the progress of invention, so that only the less important remain uniform and can be accurately measured. This applies especially to the manufacture of iron and steel products, machinery and motor cars.

Mineral output can be treated in the same way as industrial. The production of electric power should be included.

The statistics so far indicated can be given monthly, quarterly and annually. A considerable number are given in the Monthly Survey of Business Conditions.

Agricultural production because of its seasonal nature is in a separate category, and the figures relating to it will naturally be published in a different form and relate to the harvest year of each crop. In view of the want of precision of most of the agricultural statistics, it is advisable that they should only be given in round numbers. It is suggested that the one or more forecasts now issued between the statement of the areas sown and the estimate of the final yield, ought only to be given as rough percentages of the previous years, till their accuracy is improved.

(b) *Commodities combined, Index of Industrial Production.*—When one or more suitable series have been obtained for each industry, the next step is to combine them into a single index of production. This involves the choice of a particular year in which each entry shall be written as 100, and the choice of weights. The year should on first principles be the same as that chosen for index numbers of wholesale prices (see below), but since the date recommended for prices is prior to the initiation of a production index a compromise is necessary, *viz.*, that where the indices of production and prices are brought together the latter should be expressed as a percentage of its level at the date when the general production index is initiated. If price index numbers are constructed on a geometric mean this process involves no difficulty or ambiguity. Reasonably accurate weights can only be obtained from a Census of Industrial and Mineral Production. If it is decided not to take this Census, then very rough weights can be deduced from existing statistics, and it may be worth while to construct an index, if it could be given in such a way as to avoid its use as a precise measurement. If, however, the Census of Production is to be taken, it will be best to postpone the initiation of an index of production till its results are available, so as to avoid the confusion that would result from the existence of two numbers, one more reliable than the other.

The combination of an industrial with an agricultural index is not recommended for India, if only because the latter would outweigh the former so greatly. It is recommended that no general index number of agriculture be compiled till the essential statistics have been greatly improved.

The construction of an Index of Production should follow the methods of the British Board of Trade, which have been explained by Mr. Flux in various papers read to the Royal Statistical Society.

5. *Prices.* (*i*). *Wholesale prices.*—The Indian Trade Journal and unofficial publications appear to give all practicable information about the detail of movement of wholesale prices in the larger towns, and it is therefore only necessary to consider the formation of general index numbers.[1]

[1] Some consideration is given to wholesale prices in smaller markets below.

The main uses of index numbers of wholesale prices are in relation to national, not to local, economic problems, and for the study of general tendencies. They are considered in relation to the movement of currency, exchange, of wholesale prices in other countries, and of indices of production, wages, retail prices, etc., in each country. Further, they form one of the most important indications of the general movement of the trade-cycle through its various phases.

It is very doubtful whether any good purpose is being served by the construction of local wholesale price index numbers for Calcutta, Bombay, etc., and we do not propose to discuss them.

The existing general index number of wholesale prices in India is undoubtedly unsuitable for its purpose. The figures are expressed as percentages of the year 1873, the list of commodities has not been revised since 1889[1] (so far as we could ascertain) and includes indigo and other commodities no longer of importance, and it is unweighted. It is similar in its constitution to the old British Board of Trade index number, which was discarded, because of its imperfections, about 1920. We strongly recommend that a new index number should be constructed at once on the model of that of the Board of Trade. The distinction between prices of Imported and Exported goods (which we discuss below) should be dropped, and replaced by categories similar to those in Great Britain (Food, and Not-Food, with sub-division into Cereals, etc., in the first, and Minerals, Textiles, etc., in the second). We recommend the adoption of the geometric mean as in Great Britain, especially because it allows automatic change of the date at which it is equated to 100, which will be necessary for comparison with other index numbers when they are constituted.[2]

It is suggested that in the first instance the year 1926 or 1927 should be chosen for equation to 100. The main fall of prices from the maximum in 1920 was finished by 1923 or 1924, and the year 1924 has been selected in some cases in other countries. But the rupee exchange on London did not settle down till 1926, and this is *prima facie* a good date to select. English index numbers, however, were disturbed by the effects of the coal dispute in 1926, and this would lead us to recommend 1927. The choice of the exact year in this period should be carefully considered.

It is believed that a sufficient number of accurate statistics of prices can be carried back to 1926 and earlier to allow the construction of an index from that date, but some manipulation and approximation may be necessary.

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[1] Except for slight alterations in the choice of quotations. Entries for Kerosene Oil and Coal first appear in 1888 and 1839, respectively.

[2] The method of adjusting arithmetic numbers by simple proportion to a new base year is liable to introduce errors which may be important.

The choice of series presents difficulty. When a Census of Production is completed, a number of entries for each kind of commodity can be chosen in proportion to its importance in the national economy as was done in Great Britain, and the want of precision in the Indian agricultural statistics would not in this connection have serious effects. But we consider that the revision and re-basing and broadening of this number is so urgent, that we recommend that the weighting (in this case accomplished by choosing the number of series in each class of commodity) should be done on the basis of existing statistics.[1] In spite of the inconvenience of having two series in existence, the constitution of the index should be modified when the Census of Production is completed · it is unlikely that the changes in the index would be at all considerable.

We have recommended that the separation into Imported and Exported articles should be given up. Much better figures are available for the purpose of comparing the average prices of imports and exports in the "Review of the Trade of India" for 1932-33, page 17, and in the "Monthly Survey of Business Conditions." Though such figures can never be exact, based as they are on average prices computed from declared values and not covering all articles traded, yet they do indicate the relative movements of Import and Export prices, the knowledge of which is important. How far they differ from the index numbers of 'Imported' and 'Exported' articles as now published is shown in the following table :

	Imports.		Exports.	
	From Review of Trade of India.	Eleven 'Imported articles.'	From Review of Trade of India.	Twenty-eight 'Exported articles.'
1913 or 1913-14 . .	100	100[2]	100	100[2]
1924 or 1924-25 . .	180	185	154	145
1928 or 1928-29 . .	133	146	127	138
1930 or 1930-31 . .	105	134	94	115
1931 or 1931-32 . .	88	115	78	81

The 'Imported' and 'Exported' prices are market prices at Calcutta, Bombay, etc., and are not directly comparable with the

[1] In choosing the weight for agricultural products the part of each product which is consumed by the grower, etc., without taking part in a cash transaction, should be excluded from consideration.

[2] Obtained by proportion from the series which are based on the year 1873.

averages f.o.b. and c.i.f. which form the basis of the other columns.

Market wholesale prices of agricultural produce are reported at frequent intervals for many smaller towns in each province. We have not had the opportunity of examining the method of record, but we think attention should be given to exact description of the grade, and the statements should be for particular days and not averaged over a period.[1] The distinction between wholesale prices for small lots and retail prices is not very clear. Since the variation in prices is taken into consideration in modifying land revenue, it is important that the prices should be definite. For most purposes, however, careful reports from a limited number of markets are all that are required.

(*ii*) *Retail prices.* (*a*) *Separate commodities.*—It is known that retail prices vary greatly from village to village and even within a city, and that there are many grades with the same general name which command different prices.

For example there were published in 1914 the prices of rice in 190 places scattered through India, varying from Rs. 4 to over Rs. 8 per maund. The Provincial and State averages varied from Rs. 4-9-0 in the Central Provinces and Berar to Rs. 6-7-0 in Mysore. Similarly in the statement of retail prices of common rice stated in the Statistical Abstract for 1931, the price varied from Rs. 3-0-0 in Midnapur (Bengal) to Rs. 8-0-0 in Delhi.

These great variations alone make it very important to secure comparability by ascertaining prices at the same places year by year for the purpose of averaging.

It is even more necessary to make certain that the same grade and condition of each commodity is priced in each record for each place. The returns appear to be made in the market towns in a perfunctory manner, and there is no security that they are comparable from time to time and place to place.

The collection of these prices at very frequent intervals at a great number of recording stations seems to be unnecessary, and the great multitude of returns makes supervision very difficult and it is probably ineffective. We may refer to the admirable Report of the Statistical Enquiry Committee (Government of Madras, Revenue Department, G. O. No. 1000, 11th May, 1932), in paragraphs 8 to 21 of which these subjects are discussed. We may recommend that instead of a double system of weekly and monthly reports, the prices should be ascertained on one day only in each month (as is the custom of the Ministry of Labour in

[1] Supplement to the *Calcutta Gazette*, December 14, 1933, page 1715—"Raw jute (weighted average) at Sarisabari Rs. 3-14-0 to Rs. 2-14-0" is not a satisfactory statement.

A clear distinction ought to be borne in mind between the price at which goods are bought in the market and the price received by the cultivator, who may have to pay market-costs and the cost of conveying the goods to the market.

England) from a relatively small number of towns[1] of various sizes in each province. Not only should the grade and place, shop or market, be rigidly defined and adhered to, but also the nature of the transaction (method of sale, unit of account, etc.) that is the subject of report should be unchanged from month to month. Even the time of day should not be varied.

The collection of retail prices in large towns presents different problems, because of the variation from shop to shop and district to district and the multiplicity of shops. The practice of Bombay and Ahmedabad may be commended; there we understand that the ascertainment of prices is organised by the Labour Commissioners and that all necessary care is taken to ensure comparability.

When the fundamental statistics of retail prices are brought to a sufficient degree of accuracy, it may be considered whether series of the price movements of separate commodities should be computed for the several provinces, and perhaps for India as a whole, showing, not the average of actual prices, but the average variation of prices, expressed as percentages of the level at the date at which 100 is taken for wholesale prices. A general view of the relative movements of the retail prices of different commodities has its uses. The validity of averaging the variations in different places depends in this case on their not being very different from each other. We might hesitate to average the price-changes of rice between 1914 and 1931 when at Salem it fell from Rs. 7·1 to Rs. 5·4 and at Ahmedabad it rose from Rs. 6·2 to Rs. 6·7. If averaging is justified, it is not necessary here to introduce weights.

(*b*) *General Index number of retail prices.*—For some purposes (see Chapter V, Section 6) it is of importance to compare the general movements of wholesale prices with those of retail prices, of wages, and other series, apart from the rather different objects attained by measuring the cost of living, or comparing the changes of the wholesale price of one commodity with its retail price. It is not recommended that such index numbers should be computed for separate provinces, but that data should be accumulated for India as a whole. The index numbers for separate commodities discussed in the last paragraph must first be set on a firm basis. For their combination weighting is to be recommended, and it will be necessary to make careful estimates of the relative importance of the commodities in the personal spending of the inhabitants of India (excluding again consumption not on a cash basis). Since it is probable that the various prices will show divergent movements, the weighting must be reasonably precise.

Since the series of prices of commodities can only include articles which are exactly definable and do not change in their qualities except over long periods, the composite index will relate

[1] If the Revenue authorities need reports from a larger number of towns, these should no doubt be collected, but should not be used for averaging.

only to food, fuel and the simpler kinds of clothing. In relation to the wholesale index number, it will indicate the effect of the cost of merchanting, but hardly at all that of manufacture. This difficulty is encountered in all countries.

We do not think that this index number should be initiated till the preliminary steps of improvement of the data have been satisfactorily taken.

(c) *Cost of Living Index.*—Here, on the other hand, we do not recommend an all-India number, which might be wrongly applied to provinces for which it was not representative; nor do we think it practicable or advisable at present to attempt a calculation for villages, where much of the consumption is not on a cash basis, and where there is considerable local variation. But we think that the measurement of changes in the cost of living is important in those large towns where a considerable part of the wage-payments are on a cash basis, in order that public opinion may be well-informed when the merits of a wage-dispute turn on the expense of living. As is the present practice in India separate index numbers should be made for each town, and they should not be averaged together.

Very satisfactory numbers exist already for Ahmedabad, Sholapur, Nagpur and some other towns, and that for Bombay is about to be revised in an adequate way. To form these numbers it is necessary to have a group of accurate budgets, covering the expenditure on necessaries of the working-class. The number of budgets need not be large, unless the divergence of expenditure among them is unexpectedly great. It is important, however, to get good weights to apply to the categories of food, clothing, fuel and rent separately. The resulting index shows the change in the expense of maintaining a defined standard of living, so far as ordinary necessaries are concerned, for a family whose income is near that of the average of those from whom the budgets are obtained. It has not been found practicable to make separate index numbers for different classes of income in other countries.

It is, however, a question whether the numbers ought not to be computed separately for different communities, since for example, the cost of a diet in which meat is an important element may move differently from that of one which is mostly composed of grains. In Madras it has been held that the variation might be important, but in Bombay and Ahmedabad the contrary opinion was expressed.

The attempt to obtain a separate number for salaried persons, under, say, Rs. 100 a month, is worth making; but, so far as we know, success in this has not yet been achieved in Europe or America.

The cautions given above in regard to retail prices apply here. The prices, month after month, must be of accurately defined qualities bought under similar circumstances. In Nagpur and

Bombay actual specimens of the qualities included are kept at the headquarters, a practice to be commended.

6. *Wages.*—There are three categories under which wage statistics may suitably be collected in India. A. Factories and Mines; B. Other Urban Occupations; C. Rural Occupations.

A. There is no reason in the nature of things why wages should not be recorded for factories coming under the operation of the Factories Acts, as they are for mines, etc., by the Chief Inspector of Mines. Especially where industries are protected by tariffs or receive government assistance in any form, there would be no cause of complaint, if wage-rates and other information relating to the cost of production were required. We have not, however, been able to find any recent general statistics, except those relating to Cotton in the Bombay Presidency up to 1930 and Jute in 1929, but we understand that the Bombay Labour Office is taking steps to collect further information for 1934 (permanent factories) and 1935 (seasonal factories), and it is instructed to make an investigation into wages in cotton factories from the beginning of 1926 up to the present date.

We have already recommended that the total wage-bill should be recorded in a Census of Production, but this will not give sufficient detail and will not be repeated annually.

A distinction ought to be drawn in all wage-statements between rates paid for a given time (*e.g.*, day, shift, week or month) or given task, and earnings which are affected by intermittency of work. The former must be known for the compilation of any index number of wages. The latter, when it is obtained by dividing the total paid in wages by the average number employed, is useful in relation to the labour-cost of output and some other purposes. It does not seem possible in India to obtain information on any large scale on the other aspect of earnings, namely the amount received by individuals in a week or month or year, since there are rapid changes in personnel and no individual record is kept by the pay-master.

We recommend that a schedule be drawn up in sufficient detail of occupations for each factory industry, that as soon as possible the customary wages paid in each district[1] should be ascertained, and that in future a record should be kept of all changes in these rates. This task naturally falls to a Labour Office or Department in each province, and the establishment of such Office in each province where factories are numerous is a necessity if adequate information about wages is to be obtained. In this matter Bombay has set a good example. Statistics for earnings

[1] There are, we are told, considerable variations, for which no explanation is given except custom, between mills in the same district, both in the cotton and jute industries. In such cases more than one rate must be quoted, but in figures over a period comparability must be preserved. Anonymity of the mills is, of course, necessary in publication.

in mines are already published annually. We think that they should be supplemented by statements of wage-rates, as we recommend for factories.

The Railway Statistics already include the total cost of the staff and the total number employed. No doubt a statement could be made of the rates for the various grades in different districts, and changes in these rates could be recorded.

B. Very little attention has been hitherto paid to the rates of wages of the very numerous classes of men who work outside the factories in the towns, such as builders, municipal employees, artisans, porters and unskilled labourers. The system, described below, applies primarily to occupations in the country, and is quite unsuited for recording wage-rates in large towns. The Urban Survey that we have recommended would provide some material, but the main work is appropriate to Labour Offices, and careful definition and exploration of the ground will be necessary before serial figures can be obtained. As with prices, exact definition and comparability are essential; casual and amateur observations are useless.

C. The only general and continuous records of wages are the returns made to or by the Revenue Officers of customary wages of ploughmen, ordinary agricultural labourers, and artisans, etc., in villages and towns in each district. For towns, except the smallest, the range of occupations included is too small. The material for villages is in some cases too indefinite (as when the rate is said to be from 4 to 8 annas a day), but this fault can be remedied as soon as serious attention is given to the compilation of the returns. The difficulty of using these figures for obtaining any comprehensive view of the general movement of rural wages lies in the very great number of separate returns and in the great inequality of wage-rates between villages in the same Province. Thus in the Punjab in 1932 returns of agricultural labourers' wages were obtained from 1,949 villages; the rates varied from 2 annas to 13 annas per diem, a quarter of them were 4 annas or less, a quarter 6 annas or more. In Madras at an earlier date we have 25 district averages, based on 142 returns, for ploughman's wages. The average of cash wages ranged from Rs. 4-3-0 to Rs. 7-10-0[1] per month. There is the further complexity that a considerable proportion of the wages are in kind, which has to be valued before comparisons can be made.

Under these circumstances it appears to be best to select a quite small number of villages in each district, preferably where a wholly cash rate is paid, and very few separate occupations, and to take care that in each successive record the wages are paid for the same work and are strictly comparable. The unweighted average of these rates for each occupation would probably be adequate to show the general movement in a Province. Since the relative numbers of village wage-earners in the different Provinces

[1] Excluding an isolated case of Rs. 10.

are not sufficiently known, at present at least it is inadvisable to state figures for India as a whole.

Index numbers.—Few countries have yet amassed sufficient data for the construction of an adequate and general index number of wage changes, and we think that a great deal of constructive work is necessary before one is attempted either for India as a whole or for the Provinces. Experiments, however, might be made in the construction of separate index numbers under A., B. and perhaps C. Under A. there is the difficulty of weighting from the fact that the Cotton and Jute Industries greatly outnumber the others. For B. the procedure is more simple, especially if it is found that the changes for separate occupations and in different towns are nearly proportional to each other. For C., ignorance of the numbers of persons employed on a cash basis of payment, and the great variation in the rates, may not improbably prevent the formation of a valid index.

For general purposes of comparing wage movements with those of wholesale prices and of foreign exchanges, it may be sufficient to have index numbers for A. and for B. For the particular purpose of comparing wage changes with the Cost of Living, it is not generally necessary to have composite index numbers, nor are they needed for study of the relative changes in the same occupation in different districts.

We may add that there appears to have been no general investigation on salaries of clerks and others. Some information should be gleaned from the Urban Surveys, and there should be no serious difficulty in assembling data from Public authorities, Railways and large merchanting houses on the subject, so that at least a general knowledge about important sections of this group might become available.

7. *Unemployment.*—It is not possible to obtain any adequate statistics of unemployment unless there is an Unemployment Insurance Scheme or other means of registration complete for places or occupations, such as is some times provided by Trade Unions. Few countries, in fact, have any satisfactory record, and the wildest estimates have been current, for example, in the United States of America. In India it is not at present practicable to organize any general statistics even in the towns.

Statistics of employment, on the other hand, are already available in Factories and Mines, and variations in employment are fairly closely related inversely with those in unemployment. We think that every effort should be made to extend these figures in scope, and publish them monthly. The reports might be developed to include all factories, mines, railways and government and municipal employees.

As monthly returns are instituted the seasonal movements should be studied, so that the causes of changes from month to month can be classed as seasonal or abnormal.

The allied problem of labour-turnover in factories is important, but presents special difficulties in India. It is to be hoped that intensive studies may be made on the continuity of employment and the frequency of changes, wherever the material for them is available. Statistics of absenteeism, such as is published in the Bombay Labour Gazette, together with statistics of employment, throw some light on the question.

There seems to be no possibility of measuring unemployment in villages or in the small trades in the towns.

8. *Profits.*—A study of the variation of profits is of great importance in the analysis of trade cycles, and the determination of the phase of the cycle in which a country stands.

The *Economist* had published in London for many years quarterly analyses of the net profits of joint-stock undertakings, and in 1932[1] initiated an index number of profits dating from 1923. In the same year Sir Josiah Stamp gave the results of an independent study in his Presidential Address to the Royal Statistical Society, June 21st, 1932[2]. A careful study of these methods and of their applicability to India is expedient before a series is introduced there; but the material exists for its compilation. The question whether it is better to construct a general index number for all industries, or only to give two or more indexes for different groups, such as Textiles, Mining, etc., will need consideration.

The statistics of Joint Stock Companies in British India and in some States show that there were 5,830 joint stock companies at work in India (including the States mentioned) during the fiscal year 1927-28. Their paid-up Capital amounted to Rs. 2,76·43 crores. The biennial publication of the Department of Commercial Intelligence entitled "Large Industrial Establishments in India" (1927) shows that there were 7,704 "large" industrial establishments in British India and the States in 1927. The areas covered by the two publications are not identical, nor are the periods identical. But it is probable that a very large percentage of the latter belong to the former. Hence an index of Joint Stock Company profits in India would be a fair index of the profits of large businesses in the country.

Indian Index Numbers might be constructed on the model of the *Economist's* with a slightly different classification in view of the fact that there are very few Indian companies operating overseas. The work could be undertaken by a private organisation, *e.g.*, a financial paper such as the Calcutta *Capital* or *Indian Finance* which receives a fair number of company reports for publication. It is however, likely that the reports sent to these journals are mostly from companies which are either situated in their areas or

[1] See *Economist*, April 23rd, April 30th, May 7th, June 25th, 1932.

[2] R. S. S. Journal, 1932, pp. 658 *et seq.*

whose shares are dealt with in the local stock market. For example, there is likely to be a preponderance of jute, coal and tea company reports in Calcutta financial papers. Hence an index number or numbers of profits based upon these reports will not be representative of all-India conditions, and it is not possible to remove this defect by combining the Calcutta index number with similar index numbers prepared for companies working in other financial centres, since there are very few such papers outside Calcutta.

Hence it will be necessary to base the compilation on the reports of companies submitted annually to the Registrar of Joint Stock Companies; and in the nature of the case the work can be undertaken only by the Government. There are, as stated above, more than 7,000 companies in operation in India, and a sample of 700 chosen on a satisfactory basis would be representative and bear sub-division into two or more groups. The base year would be located somewhere about 1925-26 or 1926-27, when conditions were as near normal in the post-war period as can be expected.

9. *Foreign Trade.*—The monthly and annual accounts and statements of the Sea-Borne Trade of British India, together with the Annual Review of the Trade of India call for very little comment. They are on a well-established basis and in general give all the detail that is practicable. We may, however, record some suggestions that have been made to us. The Imports and Exports on behalf of the Government are separated from those on Private Account, and the former are not given in as much detail as the latter. Consequently it is not always possible to ascertain the total trade in particular commodities. It might be considered whether this difficulty can be remedied without adding unduly to the amount of printing.

The classification in detail does not always satisfy the desires of the representatives of Industry, and is not always comparable with that necessitated by the tariffs. We recognise the difficulty of frequent alterations of classification, and the danger of losing comparability between successive years. But the time has perhaps arrived when the detail of the classification by commodities might be reconsidered. Comparability is preserved when the changes are merely sub-divisions of the existing categories, or distinguishing an article which has hitherto been merged in a miscellaneous heading. From any revised classification it should be possible to provide material for comparison with statistics obtained in the Census of Production (see pp. 15 *et seq.* above).

We are informed that there has been no recent revision of the classification of countries under each commodity imported or exported in the Annual Statement of Sea-Borne Trade, with the consequence that countries with which trade is now considerable are not always shown separately, while others are named which are no longer of importance. An inspection of the volume shows that there are numerous very small entries of less than Rs. 100.

Reconsideration of these classifications is recommended, always with the qualification that there should be no loss of comparability in cases where the trade is of at all important dimensions. Since trade in particular commodities is frequently developed in new directions, it is important to sub-divide the "other countries" groups from time to time.

10. *Banking Statistics.*—The whole presentation of currency and banking statistics in India will necessarily suffer change with the inauguration of the Reserve Bank. Section 58 of the Reserve Bank Act gives the Bank, with the previous sanction of the Governor-General in Council, wide powers of prescribing "the relation of the scheduled banks with the Bank and the returns to be submitted by the scheduled banks to the Bank." We hope that means will somehow be found to speed up and amplify, both as regards scheduled and non-scheduled banks, the belated and somewhat meagre information at present contained in the "Statistical Tables relating to Banks in India".

We make one particular suggestion for the consideration of the new authorities. It is that once a year—or preferably, in view of the violent seasonal movement in India, twice a year—the scheduled banks might be required to submit to the Reserve Bank, for publication in a single consolidated account, a return of their advances, classified so far as possible, not in accordance with the type of security taken, but in accordance with the purpose for which the advance is being used. The following basis of classification is tentatively suggested :—

Advances :—

(*i*) for growing or trading in raw produce,—showing principal crops separately,

(*ii*) for manufacturing purposes,—showing principal industries separately,

(*iii*) to building and contracting agencies,

(*iv*) to transport agencies,

(*v*) for trading in secondary products,

(*vi*) for trading in securities,

(*vii*) for other purposes.

We are aware that in India the looseness of the connection between the scheduled banks and the agriculturist, and the tendency of financial interests to extend over a number of industries, create special difficulties about such a classification, and that the omnibus item (*vii*), might at first be large. But such informal conversations as we have had on the matter lead us to hope that the general idea is not unwelcome, and that the interest both of bankers and their clients might be enlisted in the progressive improvement of the information supplied.

11. *Balance of Payments.*—The only information on this subject published in India itself is a table in the annual report of the Controller of Currency, in which are stated separately the balance of trade in private merchandise, the balance of transactions and the balance of Government remittance of funds, all other items being lumped together under the head "Total visible balance of accounts." The Government however submits a more elaborate return to the League of Nations, which is summarised in the latter's annual volume on "Balances of Payments". In this return the actual figures of Government transactions, separated into current and capital, are recorded, and attempts are made to estimate the volume of private payments for interest and dividends, and for other services. Practically no attempt however has been made for several years to estimate the movement of private capital, even of that part of it which is represented by the issue of new securities.

The difficulties in the way of improving these estimates in any country are well known, and are at least as formidable in India as elsewhere. Nevertheless it is to be hoped that a beginning will be made, and it might well be made with the figures for interest and dividends, which are at present calculated on a somewhat ancient and mysterious plan, and which may be suspected of not showing sufficient variation between good and bad years. It might be helpful towards improving these figures if use were made of Sir Robert Kindersley's estimates of British investments abroad, published in recent years in the *Economic Journal*[1] which have apparently been found useful for the same purpose by the Board of Trade. Some further check might be afforded if the income-tax authorities were requested to provide a separate figure of the aggregate income of foreign companies assessed for tax; but it would have to be remembered that this does not cover the whole field, and also that not all this income is *remitted*, since some of it is re-invested by the companies in India and some of it is paid in dividends to shareholders resident in India.

If this and the other current figures can be improved, then it would be well, if, without waiting for improvement in the capital figures, an estimate of the balance of payments, with all necessary cautions and reserves, could be published in India,—whether in the annual report of the Reserve Bank, the annual Review of Trade, the Statistical Abstract or all three. The general form of the League of Nations statements, with its separation into capital and current account, is so helpful to clear thinking on the problems of international exchange that this is, we think, a case in which it is a mistake to refrain from publication until

[1] September 1931, June 1932, June 1933; see especially the last, pages 200-1.

the material is perfect,—which it never can be. Until better information about long term private capital movements can be secured, it would probably be best to lump together all private capital movements into a single balancing item, making it plain that into this item all errors and omissions in the other items are subsumed.

CHAPTER IV.

GOVERNMENT PUBLICATIONS.

1. *Guide to Current Official Statistics.*—Both with a view to reconsideration of the issue of Government publications, and with a view to developing their utility to and use by the public, we think that an essential step is the preparation of a Guide to Current Official Statistics, and its issue annually or at longer intervals, on the model, *mutatis mutandis*, of the publication of that title published in England. The purpose of this Guide is "(1) to direct the enquirer to *all* current official publications that contain statistics bearing on his subject; and, more especially, (2) to inform him of the nature of the statistics he will find in the volume to which he is referred, *i.e.*, their mode of analysis, and the time and place to which they refer." Thus it consists of two parts, a detailed index of subjects, and a list of publications, the two being keyed together by a system of serial numbers. The first issue included the more important publications of the years preceding it, while the subsequent issues relate in general to only one year.

It would be important to include not only the Government of India publications, but also those of Provinces and Indian States, either in one or a series of guides.

The mere task of compiling this guide might perhaps reveal to those who undertake it the existence of superfluous or overlapping publications, and the possibility of effecting, or suggesting to the authorities concerned, economy in printing and concentration of the information contained in them.

2. *Annual Summaries.*—Besides the Annual Review of the Trade of India mentioned in Chapter III, there are two important general volumes issued annually for the information of the public. The scope of the first, the famous "Statement Exhibiting the Moral and Material Progress and Condition of India" extends far beyond the field of economics, and we have no comments to make on it, except to acknowledge the help we have received from it, and to express a doubt whether the attempts to convey complicated statistical information in narrative form are as successful as the rest of the work.

The Statistical Abstract is a bulky volume containing 854 pages (Tenth issue). It might be considered with respect to each group of tables, whether the detailed information is not sufficiently accessible to those interested in the full Report from which these tables are extracted, so that briefer summaries only are needed in the Abstract. If, for example, the 210 pages and the 214 pages devoted to Finance and to Foreign Trade respectively could be reduced without inconvenience to the public, the volume would be lightened, and room could be found for short tables relating to

statistics not easily accessible and not at present contained in the Abstract, such as those of the numbers assessed to Income-tax, number of motor vehicles registered, wages in coal mines, and series relating to capital discussed below. The construction of the proposed Guide would possibly bring to light other information that is not generally known to exist, which might find a place in the Abstract.

Statistical Abstracts generally are really of practical importance for reference by those who already know the scope and meaning of the tables, but they are used also by others, who have no special knowledge of the subjects, and take the figures at their face value, as shown in the brief headings. The practice of giving statistics without explanation in such Year Books or Abstracts is found in many countries, but it is not therefore commendable. It might be considered whether it is possible to preface each group of Tables with a brief statement showing their origin, the method of collecting the statistics, their scope and limitations. In any case reference should be given to the publication from which the figures are abstracted where one exists.

A more radical change would be to re-constitute the Abstract on the lines of the Year Books of Canada, Australia, New Zealand or South Africa, so as to combine a readable account of the changes during the year, with summary Tables of all important statistics. The existence of the "Review of the Trade of British India", that relating to "Moral and Material Progress" and the new "Monthly Survey of Business Conditions" all containing informative reading matter perhaps makes such a change redundant in India.

We should like to see a few pages of the Abstract devoted to bringing together a number of series designed to throw some light on the extent to which the capital wealth of the country is increasing (See Chapter II., Section 2). Among the figures we have found (some of them already in the Abstract) that are relevant to this purpose are the following :—irrigated area; area under improved varieties of crops[1]; consumption of artificial manures[2]; consumption of iron, steel and cement; imports of machinery; new mileage

[1] The Imperial Council of Agricultural Research have kindly supplied the following figures, based partly on recorded distribution of new seed, partly on *estimated* natural spread.

Area under improved varieties of crops in British India (1,000 acres).

1921-22.	1922-23.	1923-24.	1924-25.	1925-26	1926-27.	1927-28.	1928-29.	1929-30.*	1930-31.*
2940	4368	5076	6759	7436	8795	9450	12,418	11,298	12,016

*Excluding Bombay (except Sind).

[2] *E.g.*, Ammonium sulphate available for consumption (production *plus* imports minus exports)—tons—

1927	1928	1929	1930	1931	1932
14,514	29,584	41,468	33,140	24,078	41,811

of railway and road; expenditure of municipalities on water and sanitary works; number of new buildings sanctioned or under construction in certain great cities[1], capital expenditure on (*a*) hydro-electrical, (*b*) other electrical, undertakings and/or addition to installed generating capacity[2]. Further experience, and the results of the Census of Production, might suggest additions to this list; and it might even be possible, in the course of time, to combine some of the series into two index numbers of Agricultural Improvement and Capital Construction, respectively.

If a revision of the Abstract is undertaken the general order of the groups of Tables would naturally be considered, as was the case when the Statistical Abstract for the United Kingdom was revised a few years ago.

3. *Monthly Publications.*—The "Monthly Survey of Business Conditions" of which the first number appeared in March, 1934, assembles in very convenient form many groups of statistics of immeidate interest and importance. No doubt, as some of our proposals in Chapter III., take effect, further series, such as are available in similar publications in other countries, will find a place. It is noticeable that no statistics relating to labour are included. As in the Statistical Abstract elucidation of the scope and method of computation might be of assistance in the use of the Tables, for example in reference to the series of Import and Export Prices [Table III. (*i*).]

It is not necessary to offer comments on the other periodical and occasional publications issued Centrally or Provincially. One of the most important, that on Sea-Borne Trade is referred to in Chapter III. The Labour Gazette published monthly by the Labour Office, Government of Bombay, suggests that if other Provinces also issued similar gazettes there is no need for a central publication on Labour, apart from the inclusion of figures in the Monthly Survey and the Annual Abstract.

4. *Marketing of Publications.*—We have heard a certain number of complaints both about the late appearance of many Government publications and about the difficulty of the public in obtaining them. With regard to the former, a certain amount of delay is inevitable in all countries, and especially in a country of

[1] The Municipality of Bombay publishes the number of applications for erection of new buildings (Administration Report, 1932-33, p. 153); the Municipality of Calcutta, the number of masonry buildings sanctioned and under construction (Administration Report, 1931-32, Vol. I, App. J, pp. 83 and 87),—unfortunately neither at present gives particulars of value. It is a matter for exploration whether these and any other similar records could by co-operation be reduced to a basis which permits of aggregation.

[2] Mr. F. L. Milne, Electrical Inspector to the Punjab Government, has for some time published biennial lists of electrical undertakings in India; the latest supplement, containing information up to the years 1931-32, will soon be available.

the size and complicated constitutional structure of India. But we hope that the adoption of our recommendations in Chapter I, about the organisation of statistics will lead to considerable improvement in this respect.

We understand that the Central Publication Branch is undergoing reorganisation, and we hope that every effort will be made to nurse the new demand which may arise with the spread of education and interest in economic matters. We hope too that efforts will be made to promote co-operation between the Provinces, so as to make it easy in each Province to obtain the publications not only of the Central Government but of other Provinces.

It is very desirable that Government publications should be easily accessible to those whose keeness of interest outruns the length of their purses. We suggest, therefore for consideration, that the discount of 25 per cent. at present allowed to University and other authorised libraries might be increased, as in England, to 50 per cent.

CHAPTER V.

FORMULATION OF PROBLEMS.

1. We must now attempt to indicate the manner in which the improved information, which we hope may result from the changes and enquiries which we recommend, may be of service in guiding policy with regard to some of the familiar economic problems of India.

A country's economic strength and prosperity may be said to depend, first on the extent and quality of its productive resources; secondly, on the degree to which these resources are kept in continuous as contrasted with intermittent employment; and thirdly on the degree to which the distribution of employed resources between different uses and occupations approaches the best distribution attainable. To some extent these factors need separate notice in respect of the several types of productive resources, which may be classified loosely as (*a*) population, (*b*) natural resources, (*c*) material capital, (*d*) organisation. This method of approach to the economic problem will form the basis of the outline which follows.

2. Population differs from the other three agents of production in that while its growth is likely to lead to an increase in the total national income, it is also likely under certain conditions to lead to a decline in the average income per head. The population has lately been growing fast in most parts of the country (10 per cent. in British India between 1921 and 1931), and the evidence seems to be that it tends to grow up to improvements effected in environment (as in the Canal Colonies of the Punjab), so as to bring the standard of life again down towards the old level. Improvements in public health undoubtedly improve the efficiency of the population, and thus augment the production of food, which in turn increases efficiency. But they also, by keeping alive persons, especially infants, who would otherwise have died, tend to increase population pressure for the future. It is possible that even the rise in the age of first child-bearing, which is so much to be desired on general grounds, may, by improving the health of the mother, lead to an increase rather than a diminution in the number of births per marriage. Thus there are good reasons for regarding the problem of population as the gravest of India's problems.

At the same time the problem has come recently to assume a puzzling form, owing to the great fall in the level of agricultural prices. A superabundance of food-stuffs appears to co-exist with conditions making for a pressure of population on the means of subsistence. It is possible to interpret this situation in different ways. It may be held to indicate that the population problem

has become one of *occupation* rather than of *food*, and is soluble by the development of industries which will draw off from the land a surplus population whose presence on it is an actual handicap (since it perpetuates an uneconomic breaking-up of property and holdings), but who in their new situation will furnish a useful market for agricultural produce. On the other hand it may be held that the 'overabundance' of foodstuffs is an unreal and temporary abundance, due to the disorganisation of trading markets at home and abroad, and that restoration of normal trading conditions will reveal that in India at all events the population problem is still a problem of wringing sufficient subsistence from the soil; while in any case rapid industrialisation might stimulate a greater growth of population than it could absorb.

We return to this problem in the last section of this chapter: it is possible that time alone can reveal the answer. In any case it seems clear that much more light is needed on the comparative behaviour of birth and death rates, and still more of fertility, among different races, religions and classes, and in districts differently situated as regards the rapidity of agricultural improvement and as regards their exposure to the stimulus of industrial development. Such light may assist in guiding opinion as to whether or no the various economic and social forces making for a reasonable balance between population and production are working with sufficient strength. It is for this reason among others that we have recommended that the nucleus of the Census Organisation be kept permanently in being, and that the public health authorities co-operate as far as possible in the projected village-surveys.

3. Since the effective area and fertility of a country's land can be—and in India have been—increased by measures of reclamation, forest conservancy, irrigation and so forth, the growth of natural resources can conveniently be considered together with the growth of material capital.

The rate of growth of capital wealth depends primarily on the amount of effective saving done by the population and this again on the extent to which their income affords them a surplus over necessary consumption, and on their willingness to convert this surplus into productive wealth. In India it is evident that the power of the vast mass of the people to save effectively is small, and that such power as exists is often not used, the surplus over necessary consumption being devoted either to barren expenditure[1] or to the acquisition of forms of wealth which serve as a store of value to the possessor but do not enhance his power of earning an income. It is true that very great inequalities of wealth exist, and that this is a factor which in most countries has been found favourable to a rapid growth of capital; but it is not

[1] Expenditure on feasts and the like, so far as it is dictated by social customs which give no pleasure to the individual, is to be deprecated: it is not necessarily to be condemned merely because it means taking enjoyment in large doses at intermittent intervals.

clear that the rich of India taken as a whole are either sufficiently numerous relatively to the whole population, or sufficiently immune from habits of large expenditure and of saving in unproductive forms to make it possible, unless these things are altered, for the country's wealth per head to grow very fast. Further, part of the savings of the richer or more thrifty sections of the population are devoted to financing the consumption of the more unfortunate or improvident, and therefore do not materialise in income-producing wealth.

In India the Government has played an important part in organising the growth of wealth, both by borrowing for expenditure on land improvement and other forms of capital development, and by current expenditure (on the services of technical experts, etc.) which has the effect of increasing the productive powers of the land, notably through the improvement of the breed of important crops. With the difficult financial position of recent years many of the 'nation-building' activities have had to be conducted on a restricted scale: and the questions arise as to whether they can be carried on more intensively in future, and if so how they should be financed.[1] Further the question arises as to whether in certain circumstances Government borrowing can assist in converting into material wealth savings which would otherwise have gone to waste; in particular, in converting India's huge hoards of idle gold into tangible income-yielding capital situated within her own borders. Obstacles to development arise from the fact that some of the traditional sources of public revenue have for various causes shown inelasticity in recent years; and it is likely to become necessary to explore new ones if the development of the country is not to be retarded. For all these reasons the problems of Public Finance in India are closely connected with those of the growth of wealth.

It is hoped that the group of surveys which we propose, together with the improvements which we suggest in the organisation of agricultural statistics and certain other minor suggestions, will help to throw light both on the total income of the country and on the relation which it bears to the growth of wealth, and will thus furnish material for judgment as to whether wealth is growing reasonably fast as compared with population. It is hoped too that the rural and urban surveys may help to provide such information about the incomes and standards of life of the various classes of the population as is required for a wise distribution of the burden of taxation.

4. The problems of business organisation in India are many and varied, and upon many of them—such as the functioning of the managing agency system in industry—such general enquiries as we propose can naturally throw no light. So far as agriculture goes, it is tempting to find a common origin for many of its problems in the immense social value attaching by custom and tradition to the mere possession of rights in land. This helps to

[1] See also Section 9 below.

obstruct the formation of rational units both of tenure and of cultivation; and thus to increase the dependence of the peasant on the money-lender and the middleman. It also tends to increase the capital value of land out of reasonable proportion to the annual value of its produce, and thus to encourage excessive borrowing. Perhaps also it helps to account for the fact that the contribution of the large-landlord class, where it exists, to agricultural organisation and improvement, does not seem to have been impressive as compared with its rent-roll or with the contribution of similar classes in other countries.

These problems,—the relations of landlord and tenant, the relations of creditor and debtor, the relations of producer and middleman—must obviously continue to form the subject of highly specialised studies. But it is hoped that the Rural Survey which we propose may help to reveal the broad background in which they are set. By throwing more light on the cultivator's standard of life it may help to guide policy in areas in which an agrarian problem exists. By throwing more light on the various elements in the cost of agricultural production it may be of some help towards disentangling the various elements in the total of agricultural debt, and determining how much is of the nature of ordinary advances of working capital,—sometimes necessarily prolonged beyond a single season—and how much is really dead and unproductive.[1] By throwing more light on the relation between wholesale market prices and the prices actually received by cultivators it may help to afford evidence as to where there is most need for improvements in marketing organisation, and especially as to where there is a real prospect of co-operative enterprise in marketing being able to compete with the middleman in cheapness and efficiency, and where there is not.

5. The influence of the hunger for a link with the land extends beyond the field of agriculture; it is partly responsible for the generally unorganised condition of industrial labour. At any rate in the great centres of Calcutta and Bombay, the typical factory worker is still to a large extent a villager at heart and is apt to disappear for more or less prolonged periods to his remote village home. This preservation of contact with the village has advantages, especially in affording him a refuge in the event of a failure in his own fortunes or those of his industry. But his return under these conditions may not be to the advantage of the village, especially at a time of general depression; while it seems clear that his 'village-mindedness' makes against the attainment of a high degree of industrial efficiency, hinders the growth of Trade Unionism and of social insurance, and tends to perpetuate bad housing and social conditions. Incidentally also it hinders the compilation of labour statistics, since these in all countries are the product of labour organisation and legislation.

[1] We realise, however, how extremely hard these distinctions are to draw, especially since the fall in prices, has led to a further confounding of short with long, and productive with consumptive, indebtedness.

The spread of small factory industry through the countryside, assisted by the diffusion of electric power, may promote in future the growth of a stable industrial population which has not lost all contact with the countryside. But the enforcement of decent conditions of labour in such scattered factories presents great difficulties of its own.

It is hoped that the occupational urban surveys which we propose, first in the larger and later in some smaller towns, may assist in the further diagnosis of these features of Indian industrial life.

6. We now take up the point that a country's prosperity depends partly on the degree to which its productive resources can be kept continuously in use, instead of being subjected to spells of unemployment due to seasonal or other causes.

The time has gone by when it could be written: "There is as yet no 'industrial unemployment problem' in India."[1] Whatever palliatives the contact with the village may bring, the last few years have shown that neither in great industry nor in small is the Indian worker exempt from unemployment due to cyclical swings of demand. The question therefore may be raised, in India as elsewhere, whether monetary policy can be so guided in the future as to preserve a greater measure of stability of industrial activity. Such a policy is not necessarily identical with a policy directed towards preserving stability of the general level of prices, still less of the wholesale prices of raw staples; nevertheless reliable information as to the course of the prices of various groups of products, such as is afforded by well-constructed index numbers, is an essential aid towards its execution. In India, as elsewhere, the further question may be raised whether the resolute pursuit of such a policy is likely to be compatible in all circumstances with the stability of external exchange on any particular country or group of countries; and in the event of their proving incompatible, which is to be preferred. It is impossible at the present juncture to foresee exactly in what form the problems of monetary policy will present themselves for solution in the coming years; but in any case India will have a problem all her own in the nature of the mechanism available to her for carrying out her policy, whatever it may be. The Reserve Bank of India is likely for some time to be unique both as regards the proportion of the banking agencies of the country which remain outside its orbit and as regards the diversity of those which are in statutory relation with it.

Adequate information about the position of the other banks is needed for the operation of a Reserve Bank, which is charged with the duty of managing external exchange; while for any wider purpose of economic guidance, information about the distribution of banking resources and about the course of production, with special reference to the distinction between consumable and capital goods, would seem to be required.

[1] Anstey: Economic Development of India p. 118.

The question of whether a given currency is "over-valued" or "under-valued" at the current rate of exchange involves making some assumption about the normal direction and extent of capital movements, and for this and other reasons bristles with difficulties, especially under the present disordered world conditions. But index numbers of wholesale prices, of retail prices and of important elements in the cost of production, particularly wages, may all play a legitimate part in the discussion, as may estimates of the balance of payments.

7. We turn to a more specifically Indian problem of unemployment,—that of the seasonal unemployment of the cultivator due to the fact that his agricultural operations only extend over a part—perhaps on the average about three-quarters—of the agricultural year. In some cases this under-employment of the man involves also under-employment of the land, and the problem becomes one of securing greater diversification of agriculture. But sometimes the land is quietly doing its job, or taking essential repose, while the man is involuntarily idle. Much thought and effort has therefore rightly been spent on devising subsidiary occupations to fill his spare time; and questions arise as to how far such occupations can be placed on an economic basis, and how far, even when they cannot be made fully self-supporting, they are deserving of a certain measure of public support both on the economic ground that they are adding to the sum total of economic activity and on the broader ground of their social value. Such occupations fall into two main classes,—supplementary employment in local and seasonal factories, and hand work at home. With regard to the first, their increase may be expected as part of the general spread of industry outside the great urban concentrations, to which allusion has already been made (Section 5). With regard to the second, the complication arises that the part-time worker is in competition not only with the mills but with the whole-time handicraftsman whose tools are at work all the year round; and in the textile industry at all events it seems to be an unfortunate technical fact that it is precisely that branch of it, namely, spinning, which lends itself most easily to part-time work which is also the branch in which handwork in general has least chance against the machine. On the other hand the part-time worker has a real economic advantage to set against the continuous employment of the millowner's machine and the whole-time hand-worker's tool, —namely the fact that the overhead costs of his annual subsistence and his domestic workshop are being largely met out of the proceeds of his main occupation of agriculture, so that he can profitably take on work at rates which would be unremunerative to those who look to a single occupation for their whole means of subsistence. Thus the prospect of his keeping his end up are sometimes brighter than they might appear at first sight.

Successive censuses of production should reveal the rate of growth of factory industry in the country districts, while the rural survey should provide information about the existing volume

of some types of cottage industry in the village, and furnish a background for the intensive study in particular cases of the conflicting forces mentioned above.

8. We now reach our last group of problems,—those connected with the right distribution of productive resources of all kinds between different uses and occupations. The most obvious and widely canvassed of these problems is the distribution of resources between production for home consumption and production for purposes of exchange with the products of other lands.

We purposely put the problem of foreign trade control in this form, because this seems to be its most permanent and fundamental aspect. In recent years, indeed, in India as in other countries that are at once debtors and producers of raw materials, it has presented itself in the form of a problem of the balance of payments,—of providing a sufficient surplus of commodity exports over commodity imports to meet the charges for interest on foreign debt and other foreign services without adding to indebtedness abroad. But behind there lies the more fundamental question whether India should aim at the expansion of *both* her imports and her exports, with a view to the most rapid possible growth of the general standard of comfort, or at the contraction of *both* in the pursuit of some other rational purpose, such as the attainment of greater stability in her economic life. If some compromise between the two ends is sought, as it is by most countries at the present day, the problem arises as to whether the best results are obtained by retaining the maximum freedom of action in respect of such foreign trade as it is still desired to possess, in the hope that fluctuations in various markets and various sources of supply will to some extent compensate for one another, or whether it is better to enter into regional agreements, of varying degrees of intimacy, for the mutual expansion of trade, on the ground that experience shows that this is a hard world in which to try to stand alone.

Statistics must clearly be used in the formulation of a policy of foreign trade control, especially in the construction of trade agreements. It is perhaps desirable to add that they must be used with caution. Figures of consumption and production, at home and abroad, even when studied over a series of years, may in some cases throw an uncertain light on the effects of any given act of tariff policy even on the fortunes of the commodity immediately concerned, since other causes modifying the general conditions of demand and supply may have been at work; while such an act may well affect the fortunes of other commodities in ways which general reasoning may suggest, but which it is beyond the power of statistics to verify. Similarly the behaviour of the price of a protected product is an uncertain indication of the burden imposed on the consumer; something however can be learnt from a comparison of the movements of the price in protected and neutral markets and in other ways.

9. Not even a nation—perhaps least of all a nation—which shut itself off completely from the world could hope by that alone to attain immunity from disturbance. There would remain the problem of ensuring a harmonious balance between the various main branches of productive activity—capital goods and consumption goods, agriculture and industry, necessaries and comforts—and between the several members of each of these broad groups, —between wheat, for instance, and sugar, between cloth and shoes. Failure to achieve this harmony would result at best in a wasteful use of productive resources, and at worst in dislocations and breakdowns very similar to those which occur under a regime of free international trade.

In particular there arises in India, as in all countries, the problem of promoting harmonious development between country-side and town. The curiously complex form which this problem assumes today has already been alluded to in our remarks on population (Section 2). In India, as in the rest of the world, there has apparently been in recent years an 'overproduction' of agricultural as compared with manufactured goods. Since a large majority of the population is dependent upon agriculture, the ill effects of such a situation are, so far as she uses a money economy, specially prominent in her case. On the other hand to an important extent—to just *what* extent it is one of the prime objects of our village survey to determine—the food-producing village, and even the food-producing family—is a self-contained unit; and in some cases, whatever its privations in other respects, its consumption of food has probably increased in consequence of the fall of prices.

It cannot be taken for granted that this relative 'overabundance' of agricultural produce is permanent. The pressure of population growth *might* yet make it advantageous to concentrate an even greater proportion of the people upon the land, in order that each man might wring from it his own food supply and not trench upon other people's; since in the last resort it is better to go short of many manufactured products than to go short of food, and since to prove that a holding is 'uneconomic', in the sense that it does not really provide enough for one, is not the same thing as proving that additional labour on it would fail to increase its output at all.

On the other hand if productivity should keep successfully ahead of the pressure upon food, the problem of 'balance' might come to assume more decisively in India the form which it assumes in the world as a whole,—namely that of diverting an increasing proportion of the population from primary to secondary pursuits—industry, transport and personal services—where they will form a market for the cultivator's products and thus enable him to escape the perils of glut and increase the variety and range of his own consumption. And in this connection it may be remembered that the purpose of the organisation of marketing is not merely to obtain for the producer the full economic value of his product, but to promote exchanges which would otherwise

not have taken place. Meanwhile the question arises as to whether the danger of intensifying the agricultural 'overproduction' is a reason for not pressing on rapidly with the policy of improving the productive powers of the land. And the answer, once more, seems to depend partly on the degree to which rural India functions independently of a money economy. If this independence of money were complete, there could be nothing but good in extending to other products the process which has been applied to sugar, cotton and wheat. But, to take an example, while it is undoubtedly in the long run to the advantage of India that the quality of her cattle should be enhanced, (and their number consequently reduced), by intensive efforts to improve breed, it is not desirable that improvement should outrun the capacity of markets, and thus outpace the ability to support good breeding by good feeding.

The phrase 'economic planning' is used in such an infinite variety of senses that we are reluctant even to mention it in connection with the enquiries we propose, for fear of being misunderstood. It is possible for Governments to do as much harm by guiding production into unsuitable channels as they have done good by drawing idle resources of land, labour, capital and organisation into use. Intervention in the provision of general productive equipment, such as irrigation works, roads, and hydro-electric power, is free from some of the risks of intervention in particular branches of production. Water can nourish many kinds of crops, roads can carry many kinds of products to market, power can turn many kinds of machinery; similarly health and education can be used for many different ends. The State, by providing these things, assumes no direct responsibility for the use that is made of them. But in so far as it does decide to intervene in the fortunes of particular branches of production, it would seem that examination of the situation by such an Economic Staff as we propose would be highly desirable; and that systematized knowledge both of the physical outturn of the various branches of activity, and of the net value of that output so far as it can be revealed by a Census of Production and ancillary enquiries, is required as a background for their activities.[1]

A. L. BOWLEY.
D. H. ROBERTSON.

Dated 20th March, 1934.

[1] One word of caution in interpreting the Census seems to be called for. It is customary, in tabulating the results, to state the 'net output per person employed',—*i.e.*, the value of the total net output divided by the number of employees. This figure is naturally higher in industries which use much capital than in those which use little. This fact must not be taken, as it sometimes is, to indicate that "the return to labour" is specially high in those industries, or that they are necessarily specially valuable to the national economy and therefore ought to be expanded.

APPENDIX I.

THE RURAL SURVEY.

In the following schedule the general headings named on page 22, are developed in such a way as to indicate the kind of information which it is desired to collect. It may be thought that the tabulations under headings C. and D. are too detailed, and simpler forms may have to be devised. In any case careful consideration of the whole questionnaire will be necessary in reducing it to schedules suitable for the use of the investigators. The essentials are that every source of income of the residents in the village shall be taken into account, that receipts in cash shall be kept separate in the first place from receipts in kind, and that estimate should be made of the whole physical product of the village together with the value of services[1] which result in no physical output, and are often left out in accounts of village income.

The amount of subsidiary information that can be obtained in the Survey, such as is suggested on page 22 and at the end of the Schedule, can only be decided at a later stage.

A.—Existing data.

Tabulate from official reports, including the records of the village accountant:—

Area of village and use for various crops and other purposes;
Number of cattle, sheep, other animals, ploughs, etc.;
Normal yield and anna yield in recent years for each crop;
Land revenue, cess, etc.

From the 1931 Census:—houses, males, females, religion, language.

B.—Persons and occupations.

Account for all residents as in the following Table. "Resident" excludes persons living and working most of the year outside the village, but includes person working outside (on roads, etc.), and living in the village. The statement should apply to the population at the beginning of the year of observation. A record should be kept of births, deaths, and permanent emigration or immigration during the year.

Symbols: Number of families n.
" " males m.
" " females f.
" " persons p.
$m + f = p$

I.—Ages.

	Males.	Females.
Under 5 years		
5 and under 15 years		
15 and under 55 "		
55 years and over		
Total	m	f

[1] Other than services rendered within the household which evade evaluation, as do those things which some persons do for themselves, while others obtain them from paid service.

II.—Occupational Condition.

	Males.	Females.	Persons.
Non-working owners .	a_1	a_2	a
Workers: for self . .	b_1	b_2	b
earners .	c_1	c_2	c
non-earners .	d_1	d_2	d
Dependents . .	e_1	e_2	e
Total .	*m*	*f*	*p*

Classify b and c according to occupation, distinguishing males from females, on the following plan:—

1. Cultivation only occupation:— Owners
   Tenants
   Labourers.
2. Cultivation and other occupation:—Owners
   Tenants
   Labourers.

giving detail of other occupations.

3. Not cultivators: follow the Population Census order of occupation. If a person has two occupations. (*e.g.*, weaver and potter), give detail.

Include persons paid by the village for any service, and also "unproductive" persons living by religion, begging etc.

The total number under 1, 2 and 3 should of course equal b + c.

C.—Family incomes.

[Transactions in kind and in cash are to be kept separate in C. and D.]

Classify families by number of persons.

Number in family.	Number of families.
1	n_1
2	n_2
3	n_3
.	.
.	.
.	.
Total ...	n

Take care that $1.n_1 + 2\ n_2 + 3n_3 + \ldots\ldots = p$, (total number of residents in village).

Make a separate schedule for each family.

Enter at the top the personnel according to the classification under B., (age-group and occupation, if any). See that all the persons a, b and c are entered as in the receipt of income.

Schedule—

Estimate of the Net Annual Income of each Family.

Receip's.		Principal earner.		Other earners.	
		Quantity.	Cash.	Quantity.	Cash.
Obtained in kind and not sold.					
Wheat . .	*Maunds*	*(43)	...		
Barley . .	,,	*	...		
. . .	.				
. . .	.				
. . .	.				
Milk . .	seers	*	...		
Eggs . .	number	*	...		
. . .	.				
. . .	.				
. . .	.				
Obtained in kind and sold.					
Wheat . .	*Maunds*	*(13)	...		
	Rupees	...	*		
.		*	...		
.		...	*		
.					
Received in cash.					
Rent . .	. Rs.	...	*		
Wages .	. Rs.	...	*		
Handicraft .	. Rs.	...	*		
.					
.					
.					

Expenses.	For cultivation.			Compulsory payments.			Interest.
Paid in kind.	Seed.	Labour.	Other.	Rent.	Land Revenue.	Other.	
Wheat *Maund*	*(5)	*(7)	*(1)	*	*	*	*
Barley . „	*	*	*	*	*	*	*
. . „							
. . „							
. . „							
Paid in cash .	*	*	*	*	*	*	*

Net income.	Kind (not sold).	Sold.	
		Quantity.	Cash.
Wheat *Maunds* or Rs. . . .	*	*	*
Barley „ „ . . .	*	*	*
.			
.			
. Total	...	...	*

Note.—No entries where (...) is inserted : entries at, (*) wherever production, sale, or payment occurs.

Any grain taken before harvest should if possible be included in the schedule.

Include in the Table not only cereals, etc., but also fruit, vegetables, milk, gur, eggs, honey, etc., straw, forest products, etc., if grown or obtained free.

For each cultivating owner or tenant make a separate statement showing the disposal of each crop:—

e.g., Wheat—	*Maunds.*
Kept for seed	5
Consumed by growers' family	30
Paid in kind for cultivating labour	7
„ „ „ „ other services. *e.g.*, to priest	1
	43
Sold in the village	3
Sold outside the village	10
	13
Total .	56

Make a separate entry for any quantity fed to animals.

, The method of estimating the incomes of families who are not included as cultivators or cultivating labourers in the schedule above, land owners, officials, dealers, pedlars resident in the village, weavers, priests and menials, etc., will need special instructions. Supplementary earnings, such as the use of asses for hauling bricks, should of course be included. Receipts in kind should be kept separate from those in cash.

In the end there should be n completed Schedules, and in them should be included all village products and the value of local services of residents.

Note below the schedule any purchases of implements or animals and any sale of animals, and any other expenditure of a capital nature (wells, etc.).

Note also for each family any gifts from relatives or income from outside the village, such as rents or produce from land.

Note in detail cases of forced labour (*begar*). Payments for it should of course be included in the Income Schedule. Where there is no payment, if it is for purposes of production its results are automatically included in the net income of the employer; if it is for menial or other unproductive services, an estimate of their value should be added to the employer's net income. If it is for the benefit of the village generally, it should form an item additional to the village income as computed under D.

D.—Village Income.

Physical Produce—

For each crop show the following items:—

	Quantity.	Value.
Kept for seed	a	...
Used by grower—		
for family	b	...
for payments in kind	c	...
Sold in village	d	x
Sold outside the village . . .	e	y
Totals .		

1. Note payments to non-residents included in c Make a separate entry under c. for any quantity fed to animals.

Tables of this character should be made not only for the crops, but also for all animal, vegetable, and forest products. Where no quantitive statements are possible, estimates of value should be attempted.

Here a, b, c, d, e, x and y should each equal the total of corresponding items in the Family Schedules.

Estimate the value of seed, manures, etc., purchased from outside for cultivating purposes (z).

The values of animal and vegetable products used for manure or other purposes in cultivation and the work of animals are already included in the values of the products. It is doubtful whether it is advisable or possible to value dung used as fuel.

Handicrafts.—Estimates in all practicable detail should be given of the amounts of clothwoven and any other products that are measurable.

Services.—The value of services rendered not for cultivation or for other help in production has been estimated in the family schedules.

Question whether it is advisable or possible to estimate the annual value of houses.

The addition of the appropriate items under D. gives the income of the village, partly in kind, partly in cash. This addition should include everything named except (*a*) seed, while (*z*) seeds, etc., bought, should be subtracted.

The same totals, together with any payments from outside (*e.g.*, government payment to the patwari) equal the corresponding totals of family net incomes, *plus* Land Revenue, Cess, etc., *plus* Rent and Interest if paid to persons outside the village. (Payments within the village should have been counted in the income of owners or money-lenders). In comparing the totals, *x* and *y* (values) should be used in D. instead of *d* and *e* (quantities).

	Quantities. Wheat, Barley.	Values. x and y.
Produced in village (net)	...	...
Received from outside	...	...
Income of residents ... Total ...	...	...
Land Revenue, Cess, etc.,... ...	...	...
Rent and interest paid to non-residents	...	...
Total ...	...	...

Give an account of the totals of each class of sales to, or purchase from, persons outside the village of animals and any goods which are of the nature of capital transactions, and have not been included as income. Animal products and the work done by animals have already been brought into account.

Also give an account of any capital expenditure on wells, improvements, etc.

E.—Village Income estimated in cash.

Evaluate the quantities in C. and D. by village prices (if used in the villages), and by market prices (less any sums paid for cost of transport), if sold outside.

Then repeat the Table above in Rupees—Values only.

Also compute the income of each family and list them in order of income. Each should be shown separately, assembly in grades can be left to a later stage. The total of the family incomes should of course equal the total 'income of residents' in the new Table.

F.—External Purchases.

Give whatever account is practicable of quantities and values of goods for consumption purchased outside or from travelling salesmen so as to have some check on G.

G.—Family Budgets.

Construct, on as direct evidence as is possible, detailed budgets for typical cultivating owners, tenants, labourers, etc. Give detail of personnel of family.

Keep receipts in kind separate from those in cash, as indicated below.

Income for Family Consumption.

Obtained in kind and consumed.

	Quantity.
Wheat	
Milk	
Fruit	

Received in cash.

	Rupees.
Sales	
Wages	
Total cash	

Consumption and Expenditure.

	Obtained in kind. Quantity.	Bought. Quantity.	Cost. Rs.	Total Quantity.
Food—				
Wheat . . .				
Milk . . .				
Fruit . . .				
Salt . . .				
Oil . . .				
Clothing—				
Rent—				
Interest—				
For services—				
Thatching—				
Guests—				
Gifts—				
Education—				
Medical—				
Other—				
Total cash expenditure . .				

Note any exceptional expenditure on marriages, etc.

Supplementary Enquiries and Suggestions.

Besides those named on p. 22 above or already suggested in the Appendix, attention may be given to the following :—

In the tabulation of the village totals the quantities and values which are the subject of uncontrolled estimate should be distinguished from those where the observations are believed to be reasonably accurate. Enquiries in neighbouring villages would be useful in checking some of the estimates.

If the officials of the Public Health Departments are consulted they might suggest observations which would be of use to them in studying the causes and extent of illness and lack of physical fitness.

Similarly the Agricultural Departments may wish to be informed on various matters not included in the schedule, such as the yield of milk per cow, or the value of bullocks' work.

APPENDIX II.

Measurement of the Accuracy of Sampling.

The following notes illustrate the application of the theory of sampling to the proposed Rural Survey. The formulæ given are approximate, but sufficient for the purpose.

The 'universe' is the whole number of villages (N) from which the selection of (n) villages is made.

$k = n \div N$ is the reciprocal of the sampling factor.

I.—Proportions and percentages.

If p is the proportion of villages in the universe that satisfy a certain condition, *e.g.*, containing less than 500 persons, the number of such villages expected in the sample may be written.

$$pn \pm \sqrt{[pqn\ (1-k)]}$$

or as a percentage $100\ p \pm 100\ [pq\ (1-k) \div n]$

where $q = 1-p$. and the expression written after $\pm$ is the standard deviation.

Thus for Madras $p = \cdot 42$, $n = 100$, $k = \frac{1}{396}$.

The number expected per cent. is 42 ± 5. In fact 44 were found.

II.—Averages and totals.

The relative accuracy of a total is the same as that of the corresponding average.

If s is the standard deviation of the frequency group formed by quantities, *e.g.*, the number of houses, in the N villages, and A is the average of these quantities, then the average expected from the sample may be written.

$$A \pm s\sqrt{[(1-k) \div n]}$$

Thus in Madras and the Punjab the values of A, s, k and n for the houses were respectively

$$197,\ 200,\ 1 \div 396,\ 100$$
$$145,\ 140,\ 1 \div 28 \cdot 6,\ 200$$

and the forecasts were, therefore.

$$197 \pm 10, \text{ and } 145 \pm 10$$

while the averages found were 188 and 143.

For village populations the values of A and s were 981 and 960 for Madras, and 704 and 655 for the Punjab.

The forecasts were, therefore.

$$981 \pm 96, \text{ and } 704 \pm 15$$

while the numbers found were 936 and 663.

In these and similar cases it will be noticed that the value of k has very little influence, in fact its introduction only affects the error by one part in 50 in the Punjab and one part in 800 in Madras. Consequently the number (N) of the villages in the Province has a negligible effect. On the other hand great importance attaches to the number (n) selected. With $n = 200$ the standard deviation of the average is less than one-fourteenth of the standard deviation (s) of the quantities in the population, which of course depends on the dispersion or scattering of these quantities. s in the cases just given is remarkably great, since the villages vary very considerably in size.

In Case I. *proportions*, the frequency of the values of p expected in sampling is approximately normal; the chance of the difference between the proportions in the sample and the universe exceeding the standard deviation is about 1 in 3, and that of it exceeding it greatly is very small.

In Case II. *averages*, the distribution of the values of A expected in sampling is also approximately normal, if the frequency group of the population does not differ radically from the normal distribution. Whether this is so or not can be determined from the sample. For example the distribution of the number of Hindus in Madras was very abnormal, some villages containing few and many 100 per cent. Similarly abnormal distributions may be expected in the case of crops only locally cultivated. An approximation to the chance of exceeding the standard deviation can sometimes be obtained by combining the standard deviation of the chance of including a village that has an uncommon characteristic, with the standard deviation of the average in such villages. The effect approximately is to replace n in the formula by a smaller value m (the number with the characteristic), thus increasing the standard deviation; but the exact formula needs working out according to the circumstances.

Thus it is not surprising that the number of non-Hindus per village found in Madras, *viz.*, 70 did not fall within the limits 98 ± 14 given by the standard deviation.

Special care will be necessary in handling the estimates where the quantities occur sporadically or vary very greatly from place to place.

III.—Ratios.

Under this term we include such measurements as persons per house. Males per 1,000 females, yield per acre. If $x_1, x_2, \ldots$ maunds of wheat are the crops in villages, where $y_1, y_2, \ldots$ bighas are sown with wheat, and x and y are the averages of these, then the yield in maunds per bigha estimated from the aggregate of the n villages is

$$(x_1 + x_2 + \ldots) \div (y_1 + y_2 + \ldots) = nx \div ny = x \div y$$

The averages x and y separately have nearly normal frequency, and together their frequency approximates to that of a normal correlation surface.

Write s_1, s_2 for the standard deviations of $x_1, x_2, \ldots$ and $y_1, y_2, \ldots$; then $s_1 \div \sqrt{n}$ and $s_2 \div \sqrt{n}$ are the standard deviations of the averages x and y.

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Write $r = (x_1 y_1 + x_2 y_2 + \ldots) \div n\, s_1\, s_2$ for their correlation coefficient.

Then the yield, $w = x \div y$

$\log w = \log x - \log y$,

$dw/w = dx/x - dy/y$

Squaring and taking the mean, and writing S for the standard deviation of w, we have

$p.\ (S/w)^2 = (s_1/x)^2 + (s_2/y)^2 - 2r\,(s_1/x,\ s_2/y)$, as an approximate expression.

If the correlation was perfect, that is if the yield per bigha was the same in every village, $r = 1$, and $S = 0$, and as r approaches unity S approaches zero.

r, s_1 s_2 can be determined approximately from the sample, and thus an estimate obtained of S.

We have here an explanation of the accuracy with which the samples give the number of persons per house and the number of males per thousand females.

If it is ascertained that S is small, it follows that the estimate of w is more accurate than that of nx, the total yield. Hence if the area in the Province under the crop is known, we can obtain a better estimate of the whole yield by applying w to that area, than by multiplying the aggregate yield in the sample by N ÷ n, which is the method suggested on page 19. This alternative method of estimate may be of far-reaching importance and apply to many of the quantities which we desire to know. In particular the most accurate way of measuring income may be to compute average income per house from the sample aggregate and apply it to the number of houses in the villages of the Province. This comes to nearly the same thing as multiplying the aggregate of the incomes in the sample by the factor, 'houses in all villages divided by houses in the selected villages according to the Census of 1931.' This corrects the error that would be present, if the average number of houses per village in the sample differed significantly from the average for the villages in the Province, and the sample aggregate was multiplied by N ÷ n.

The selection of the villages as proposed on a geographical basis will, so far as the characteristics of villages are homogeneous through a district, differing from the villages in other districts, introduce the element known as 'stratification' into the standard deviations and make them smaller than in the formulæ given. The increase of accuracy from this cause is, however, usually quite small, as can be gathered from the formulæ that relate to it, given in statistical works. It is partly because of the slightness of this improvement, that some suggestions that have been made for securing homogeneous districts have not been adopted. The small gain in accuracy is outbalanced by the grave risk of losing the exact equality of chance that any village may be included in the sample.

A. L. B.

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